# CHOICE OF TECHNIQUE IN INDIAN INDUSTRY WITH SPECIAL REFERENCE TO TEXTILE INDUSTRY

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*CHAPTER: ONE*

# INTRODUCTION

In terms of technological progress Second World War was a great leap forward quantitatively as well as qualitatively. Availability of multiple techniques of varying factor-intensity raised the question of appropriate technology or the 'choice of technique' for a country. Therefore the 'choice of technique' debate started in post Second World War period and gained momentum in 1950s and 1960s. Dobb, Sen and Kalecki were the pioneer theoretical contributors in this period. In 1950s this debate erupted in India as well when Ambar Charkha scheme was launched and almost all-leading economists participated in it. It was argued that capital-intensive technique and labour-intensive technique are growth stimulating and employment generating respectively under certain restrictive assumptions, like- free market, perfect mobility of factors and flexibility of wages. As overall economic growth was the target to achieve capital-intensive technique was supposed to be the best to opt for.

In 1980s sporadic studies started coming out casting doubt on supposed superiority of capital-intensive technique. But with the advent of Globalisation and growing activism of international economic institutions the tide in favour of capital-intensive technique is rising high.

The importance of this debate lies not only in determining sectoral choice of technique but also in deciding the growth path of an economy. Concomitantly a host

of issues like- investment, employment and consumption planning are also involved which is all the more important for developing countries where planning is a major policy instrument and market forces are not expected to provide optimal solutions.

Generally speaking technology extends the human capability and works as critical input to transform basic input into output. It is often considered as fifth factor of production. Technology is the sum of knowledge of the means and methods of producing goods and services. It also includes methods of organisation as well as physical technique.

In a sense the history of human civilisation is the history of technological progress. Historically societies have progressed technologically from primitive to modern stage from wheel cart to motorcar, from primitive boat to nuclear ships and from bow and arrow to missiles and rockets. These technological developments were not sudden but a result of gradual development of the society as a whole. Besides certain exceptions, minor quantitative changes are an on going process culminating into qualitative change in the historical process over a period of time. Naturally there must be a plethora of technologies competing with each other for successful adoption and for subsequent development. Thus with newer scientific developments minor and continuous qualitative technological change pave way for qualitative technological change in course of history.

In primitive classless society technological progress was dictated by mankind's drive to fight out the vagaries of nature and to augment production to meet their ever-growing requirements. When hunting and food gathering economy became unable to support their growing population agricultural technology came into existence. This

development produced enough surpluses in society to give birth to riverine ancient civilisations. Thus the dawn of civilisation was ushered by production of surplus and later, in the course of history, civilisations leapt forward whenever newer technologies followed by new and advanced production relations opened up new vistas for further consolidation of surplus.

Apart from this, the surplus generated facilitated technological progress and capital accumulation. One part of this surplus went into conspicuous consumption of surplus owning class and the other part into capital accumulation. Capital accumulation pushed capital-intensity further. Therefore, surplus generation and increment in capital-intensity along with technological progress proceeded in tandem. At least this was the case in whole medieval India [Habib, 1981]

After the industrial revolution technological change became more rapid and all encompassing. Capital-intensity increased further with mechanisation and substitution of biological sources of energy by mechanical sources. An organised system of technology development came into existence. The volume of surplus and avenues of surplus generation was expanded so much that now it became possible to divert some part of surplus towards organised development of technology. Best brains were hired to meet this requirement. While most of earlier technological change was brought about by minor modifications carried out by working class through 'learning by doing', in this period technologies were developed by in laboratories by scientists. Naturally this quickened the pace of technological change and resulted in further increment in capital-intensity, capital accumulation and surplus. Around this time the focus of technology shifted from generating higher surplus only to increase the share

of profit in it. Slavery and colonisation was the historical product of this attempt by surplus owning class.

World Wars brought major technological breakthroughs quantitatively as well as qualitatively, opening up a vast number of technological options. These wars were fought over the issue of gaining larger share in profit by expanding authority over a large landmass. After the Second World War it became clear to the surplus owning class that the possibility of expansion of surplus along with increasing share of profit lies in tapping market forces and relying on distribution effect of technology rather than on output effect. After this capitalistic transformation every little object under the sun has come within the purview of system of exploitation and that too, more systematically and vigorously for surplus generation. This has been achieved by reducing relative wage costs in process of production through mechanisation of production resulting in further exploitation of labour. Moreover, shorter trade cycles, which are inherent in capitalistic mode of production, have also played their role in this process by introducing uncertainties in the system. There was tremendous increase in capital accumulation and so the pace of conversion of primary capital into secondary capital quickened.

It is universally accepted that the economy works as an integrated system. Apart from capital there are several other components of this system, most important of them are technology, market, producer and labour. The strategy of profit maximisation is based on continuous change of technology by making it more and more capital-intensive, i.e., out of the four variables having bearing on output only one is being worked upon. Therefore, the law of decreasing returns is bound to set in

sooner or later. In fact, this is a compulsion of the ongoing mode of production. It can not temper with other three components in existing system at the risk of being crumbled down. This continuous attempt to change technology has produced multiple competing technological options. For example, sugar manufacturing; iron ore extraction and cloth weaving are now possible by many alternative technologies of varying factor-intensity having almost the same output effect.

In this study, we have attempted to examine the question of 'choice of technique' in above context. Theoretically, capital-intensive technique may sound like giving optimal equilibrium. But when we examine it in field the aforesaid parameters, which are not merely economic variables only, have very strong influence on choice. Moreover, the conventional argument that capital-intensive technique is growth augmenting and consequently maximises future output than that of labour-intensive technique, which is employment generating and maximises present output, become questionable in real life. The conventional model of 'choice of technique' emerges to be very restrictive and based on certain assumptions whose validity is doubtful in field where choice is actually made.

The present study is located in textile industry of Kanpur. Textile is the oldest industry in India and once upon a time, Kanpur was the pioneer in this sector, being dubbed as the 'Manchester of India'. Textile industry also provides the largest manufacturing sector employment in the country. Moreover, many a technological option is available in textile weaving. And lastly, the debate on 'choice of technique' at first started in the context of textile industry only. As such textile industry of Kanpur is a natural choice because of the historicity of textile industry in Kanpur which provides us ample scope

to trace the reasons, associated with the question of 'choice of technique', responsible for decay of industrial cities. The availability of the whole spectrum of alternative technologies in formal as well as informal sector in Kanpur makes it all the more relevant.

This study attempts to address following principal questions.

1. How technologies of different factor intensity, like mill, powerloom and handloom have managed to co-exist in market?
2. Can this co-existence be explained in terms of conventional paradigm of choice of technique? What could be other explanatory factors?
3. What is the practical validity of output-employment trade-off debate?
4. What policy options developing countries have?

These questions are addressed in reference to textile industry of Kanpur. Apart from these principal questions, a few other subsidiary questions are also addressed. These are:

1. What are the problems of textile industry of Kanpur?
2. How does the closure of organised sector mills affect the unorganised sector.
3. Why there was rapid proliferation of powerloom in late 70s and early 80s.
4. Whether and to what extent do the mode of employment and the labour processes determine the 'choice of technique' in informal textile industry of Kanpur.

In present study an attempt has been made to answer these principal questions along with subsidiary questions as listed above on the basis of fieldwork carried out in Kanpur.

This study is divided into eight chapters. The central theme of each chapter is very briefly discussed below.

Chapter 2 discusses the theoretical model of "choice of technique" as propounded by various economists. The debate on capital-intensive versus labour-intensive techniques is discussed in context of conflict hypothesis. The last part of this Chapter shows that there are many exogenous variables, apart from endogenous ones, which significantly affect the choice.

Chapter 3 collects evidences from different countries and from various industries to test the propositions advanced by Chapter 2. It shows that many a times the theoretical model does not hold true in practice.

Chapter 4 presents a brief picture of Indian Textile Industry, outlining its structure, growth, dynamics and problems.

Chapter 5 delineates the methodology used in this study and gives a background of our area of work, i.e. Kanpur. It shows the evolution of Textile Industries in Kanpur and provides an insight into industrial structure of Kanpur.

Chapter 6 describes handloom and powerloom sector in Kanpur. It investigates not only the economics of production in both sectors but goes further in examining the whole gamut of issues involved.

Chapter 7 brings into focus the economics of technology in terms of the theoretical model and tries to examine the hypotheses advanced by various variants of 'choice of technique' debate. The basic premise, around which this chapter revolves, is the question of growth versus employment.

Chapter 8 concludes the whole discussion and tries to bring forth some policy suggestion by examining policy issues involved in "choice of technique" debate.

*CHAPTER: TWO*

# CHOICE OF TECHNIQUE: IN THEORY

## 2.1 Introduction

The question of 'choice of technique' has attracted a high degree of attention of economists and planners during recent years. This is due to the reason that massive importation of capital-intensive technology of the western countries into the backward countries during the last few decades has failed to yield the desired results. Even domestically the 'logic of market forces' has spread capital-intensive techniques in the developing countries. This is considered to be one of the reasons of growing unemployment and intensive development of small enclaves. Moreover as noted by Austin Robinson, the cost of creating additional job by adopting the western capital-intensive technology is very high. That is why expansion of employment opportunities has become very difficult for capital starved and labours abundant developing countries.

Out of many goals of the developmental policy in developing countries, providing employment to growing labour force and stepping up of economic growth, are probably the most important ones. No third world country can afford to overlook these goals. Rather it should be said that there could not be developmental policy devoid of these goals. Indian five-year Plans bear testimony to this fact.

These two goals of developmental policy form the foundation block of 'choice of technique'. There are number of techniques available to produce a unique level of output and employment. If the amount of output to be produced is given, it is the technique of production, which will decide the level of employment. At the same time if the employment is fixed, then the technique will decide the level of output, which can be produced to generate that employment. The same amount of output can be produced by two techniques generating different amounts of employment and vice-versa.

The developing countries have to decide the level of output and employment and the type of technique to be used. The problem of choosing the type of technique to be used is the question of 'choice of technique'. There are many related questions like, choice between present and future consumption and choice between output and employment. There are two extreme on the techniques, namely, labour-intensive and capital-intensive. Theoretically there could be a whole range of techniques in between these two extremes. These extreme cases are in themselves relative. A technology is labour-intensive or capital-intensive with respect to another technology. An economy has to decide the type of technique to be used keeping a finite time horizon in view. Broadly the problem before developing countries is to decide the degree of capital-intensity of new techniques. Whether they should continue with their traditional labour-intensive techniques or they should switch over to more modern and highly sophisticated capital-intensive techniques of the western developed countries.

There is a growing opinion that increase in the degree of capital-intensity is a global phenomenon. Capital-intensive techniques are presented as the 'best' option for developing countries in theoretical economics, empirical research and political

discourse. This increasing capital-intensity is inherent in capitalism and capitalistic mode of production. Globalisation (another *avatar* of capitalism) is going to spread capital-intensive technology even more rapidly in developing countries. Although in the past, labour-intensive technology had been presented as an alternative to capital-intensive technology but recently the case for labour-intensive technology or 'intermediate technology' seems weakening. Since this 'choice of technique' significantly affects output and employment in an economy, the time has come to re-examine this issue in an unbiased and objective way (in a changing global economic order) theoretically and empirically. This 'choice of technique' is crucial in deciding the growth path of an economy.

### 2.1.1 Economic Growth

An economy's rate of growth is generally understood to be a function of the saving ratio and the capital-output ratio. Since growth rate is assumed to vary directly with saving ratio and inversely with capital-output ratio, it is often proposed that a under-developed economy with a low saving ratio should concentrate on the lowering of the capital-output ratio. The country should invest in sectors with low capital-output ratio. This may conflict with the objective of creation of capital base.

The above prescription is based due largely to a tendency to identify a high capital-output ratio with capital-intensive projects and a low capital-output ratio with labour-intensive projects. The ongoing debate on choice of technique does not take in to account the composition of capital-output ratio [Kurihara, 1957]. This ignores the fact that two different concepts are involved here, namely, a capital-output ratio expressing the technical requirement for real capital to produce a given output and a capital-output ratio expressing the structure of capital or round-aboutedness. The

former measures the productivity of capital, while the latter measures the intensity of capital, i.e. the proportion of capital combined with given labour in the production function. Thus distinguished, the lowering of capital-output ratio must imply raising of the productivity of capital, where the adoption of "capital-intensive" technique must imply the greater substitution of capital for labour. This may be clarified by specifying the capital-output ratio as a function of the coefficient of capital-intensity and productivity of labour. That is,

$$K/Y=(K/N) / (Y/N)$$

Where, K/Y, K/N, and Y/N denote capital-output ratio, capital-labour ratio and productivity of labour respectively. This relation reveals that the capital-output ratio varies directly with the capital-labour ratio and inversely with the productivity of labour. Thus a high capital-output ratio can be identified with "capital-intensive" innovation or projects and a low capital-output ratio with "labour-intensive" ones only on the assumption of constancy of productivity of labour. But the observable fact is that when more or less capital is used in combination with given labour, this can cause the productivity of labour to increase or decrease, with the result that the capital-output ratio may fall not inspite of but because of "capital-intensive" innovations or projects. An underdeveloped economy with a low saving ratio should gear its development program to capital-intensive projects. The above conclusion may not be true. This is actually a question of facts, and one can not generalise one way or the other about the relationship between (K/N) and (K/Y) without examining the actual data [Sen, 1957]. An assumption of Kurihara's model, that the technique with a high rate of saving per unit of capital investment must give us a higher rate of growth is not necessarily true. Maximum rate of saving per unit of capital investment would give us

the maximum rate of growth only if the amount of investment that we can make does not vary from technique to technique i.e. K is fixed irrespective of the technique [Sen 1956]. Savyasanchi argues that in trying to discuss the problem of the choice of technique, Kurihara, in fact, is discussing the problem of choice of investment pattern. The real problem of choice arises when one type of investment pattern gives lower growth initially and higher growth later on, than the other type. In this situation the real decision would depend upon political consideration, not on economic analysis. The same amount of total investment with different techniques may generate different volumes of effective demand and given the real resources available in the economy, one technique may allow a larger initial investment than another. And when K varies from technique to technique, the technique, which has the highest ratio of (S/K), need not lead to the highest rate of growth [Sen, 1957].

### 2.1.2 Objectives

The above discussion assumes that the only objective of an economy is economic growth. The developing countries may have objectives other than economic growth. Thus choice of technique is inherently linked with the goals or the objectives of economic policy. This often dictates the criteria used for choice of techniques. Economists may give different weightage to output, employment, income or efficiency goals in the short or long run. The controversy surrounding the question of choice of technique assumes added dimensions in labour surplus developing countries. In these countries two objectives- providing employment opportunities to rapidly growing labour force and attaining a high rate of economic growth, are pursued at the same time without taking care of the potential conflict between the two objectives. This is considered to be particularly true about Indian Planning.

D.Ghosh[1] argues that if one's primary objective is to expand or maintain opportunities for employment of labour in the present, one must lean on the side of the labour using technique. There is, in this case, no problem of choice of technique, but a choice of objectives and of the selection of the technique, which is appropriate to the chosen objectives. If however the objectives were not simply employment of the present, but its expansion over time, the labour-intensive technique may be found inferior to the capital-intensive. Here again the basic choice is of objectives and not of technique. Basically this debate revolve around two objectives-

(a) Maximisation of present output or consumption
(b) Maximisation of future output or consumption i.e. maximisation of the rate of growth

Apparently the above objectives are policy objectives relating to shorter and longer-run points of view. Selection of methods of production may depend more on some 'structural features' of the economy rather than policy objective. Even when growth is the main concern of the planners, current output maximisation (in investment goods department) may be the sensible objective if the economy is characterised by investment goods bottleneck. 'Surplus-maximisation criterion, on the other hand, applies to a pure consumption bottleneck situation. The economist's usual habit of thinking in terms of a one-good model, where the same commodity is both a consumable and an investible item in a direct sense, does not catch the spirit of the argument where the nature of the macro-economic bottleneck, rather than short vs. long- run policy objectives, decides the nature of the recommendation regarding choice of technique [Bhaduri, 1968]. It highlights the importance of structural

[1] D.Ghosh: "Choice of Technique, A Clarification", Economic Weekly, Annual, January 1958.

variables in determining the choice of technique in developing countries, which are primarily labour surplus economies. These structural variables determine the objectives of economic policy as well. The objectives of economic policy are not to be decided in space. It has to be in consonance with domestic politico-socio-economic conditions.

**2.1.3 Optimum Technique of Production**

Various authors define the optimum technique of production in various ways. Economists have considered output, employment, income and efficiency criteria for selecting the technique. The type of technique selected depends upon the objective pursued by a particular country, whether it wants to maximise employment now or later. A.K.Dasgupta has defined the optimum technique of production on the criterion of the investment allocation of resources, where the relative amount of labour and capital are determined, on the one hand, by their marginal rate of substitution and, on the other, by their relative prices. Sandesara[2] defines it, as one in which output or income generated per unit of capital is maximum. Sandesara has suggested two criteria- (i) superior techniques can be used for the export market and (ii) multiple techniques can be used for the local market depending upon the availability of labour and capital. Eckaus[3] considers output as well as cost approach. The optimum technique is one, which minimises cost, which uses productive inputs with respect to their relative availabilities and which maximises the output of the available inputs.

[2] J.C.Sandesara: "On Choice of Technique in Consumer Goods Industries", Indian Economic Journal, Annual, 1957.

[3] R.S.Eckaus: "Choice of Technology", The Economic Weekly, Feb.4, 1961.

A.K.Das Gupta[4] has also favoured minimum cost approach. According to Morawetz[5] in the two factor homogenous case, the index of capital- intensity is the reciprocal of the labour-intensity. He also defines the technique on the basis of cost criterion. A technique is labour-intensive when it's ratio of unskilled labour costs to total factor costs is high relative to that of other industries or costs and vice versa is true for capital-intensive technique. Sen[6] differentiates between mechanisation and capital-intensity. He remarks that capital-intensity is defined as one which uses more machines per unit of labour. Dandekar and Eckaus have emphasised the factor endowment criterion. According to them the criterion of relative availabilities of factor input should be considered while selecting the technique. Madarson Keith[7] has considered the efficiency criterion and remarked that since capital is scarce and labour is abundant the technique, which achieves the highest output for a given capital cost, should be adopted. Joan Robinson[8] has highlighted this issue in a quite different way. She has argued that the optimum technique is decided by prospects of profit.

The above discussion of criteria to be adopted for selection of optimum technique shows various points of emphasis in defining technique of production. The techniques have been defined on following grounds-

(i) capital-output ratio

(ii) capital-labour ratio

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[4] A.K.Dasgupta: "The Choice of Technique, An Alternative Formulation, Economic Weekly, Special Number, July, 1958.

[5] D.Morawetz: "Employment Implications of Industrialisation in Developing Countries, A Survey", Economic Journal, Vol. 84, 1974, pp-491-542.

[6] A.K.Sen: Employment, Technology and Development, OUP, 1962, p.46.

[7] M. Keith: Progressive Technologies for Developing Countries, ILO, Vol. 101, No.5, 1970, p.481.

[8] Joan Robinson: "Employment and Choice of Technique" in Raj et al (ed.) Society and Change, OUP, Bombay, 1977, p.162.

(iii) labour-output ratio

(iv) elasticity of substitution

(v) relative prices

(vi) ratio of unskilled labour cost to total factor cost

(vii) machines per unit of labour

Different economists have reached different conclusions depending upon the degree of abstraction made from reality. At the same time different economist have taken different meanings of capital, capital-intensity and labour productivity.

### 2.1.4 Labour-intensive vs. Capital-intensive

Techniques are classified as labour-intensive or capital-intensive on these above-mentioned grounds. The traditional technology of the LDCs is classified as labour-intensive and modern technology of the DCs is classified as capital-intensive. Labour-intensive technology is characterised by low capital-labour ratio, low capital-output ratio (provided productivity of labour remains unchanged), high labour-output ratio, substitutability of capital by labour, relatively cheap labour, high ratio of unskilled labour cost to total factor cost and lesser machines per unit of labour. Similarly capital-intensive techniques are characterised by opposite values of these ratios.

Labour-intensive techniques maximise current consumption at the cost of future consumption, current output at the cost of rate of growth of output and employment at the cost of saving which means the investible surplus available for investment. Against this capital-intensive techniques maximise future consumption, rate of growth of output and saving. Of course this conventional theory is based on many assumptions, whose validity will be questioned further in our discussion.

Various authors have compared the size of the industry (large scale vs. small scale) and the technique of production (capital-intensive vs. labour-intensive) in the theoretical literature. They have taken in to consideration the following issues while comparing the superiority of one technique over the other.

(a) Social consideration

(b) Productivity criterion - labour and capital productivity

(c) Surplus, saving and reinvestment criteria

(d) Cost and efficiency consideration

The available literature on this issue is of two kinds. One favour small industries and labour-intensive techniques and the other favours large industries and capital-intensive techniques.

Lakdawala[9] has criticised the investible surplus criterion for choosing the technique. According to him full-employment of the people is a social desideratum and no price should be regarded as too heavy for it. Sen[10] concludes that the technique producing more employment and less output is preferable from social viewpoint even though technically it is inefficient. Joan Robinson[11] has also criticised the profit maximisation criterion for choosing the technique, as it will induce the entrepreneur to adopt the capital-intensive technique, which is not suitable for a country with labour abundance and capital scarcity. It will benefit a few and increase the misery of many families. Similarly Galenson and Leibenstein[12] favoured labour-intensive

[9] D.T.Lakdawala: "Choice of Technique in Consumer Goods Industries", Indian Economic Journal, Annual, 1957, p.143

[10] A.K.Sen: Employment, Technology and Development, Oxford University Press, 1975, p.46.

[11] J.Robinson: "Employment and Choice of Technique", in Raj *et al.* (ed.) Society and Change, Oxford University Press, 1977, Bombay, p.162.

[12] Galenson and Leibenstein: "Investment Criteria, Productivity and Development", Quarterly Journal of Economics, Vol.69, 1955.

technique from social point of view. According to them labour is neglected in Dobb-Sen model as it emphasises on the surplus criterion. Ranis and Fei[13] have favoured small industries because they generate employment in the short-run. They have pointed out that though labour productivity is low for these firms, it is not so low as to offset their favourable capital-labour ratio.

Capital-intensive techniques and large industries are favoured on the criteria of maximisation of output, saving, surplus and reinvestment, higher labour productivity and employment generation in the long run. Sandesara[14] keeping in view the objective of maximisation of income has come to the conclusion that small industries generate lower income and lower surplus than large industries. One I.L.O. study also shows that even with government assistance the small scale industries in Japan is distinctly inferior to the large scale industries in productivity, earning power and wages.

There is a whole range of techniques in between these two cases. There may not be an infinite number of options but there must be some combinations in between these two extremes[15]. The case for the 'intermediate technology' rests on these combinations from which developing countries have to make a choice.[16]

There may be difference of opinion about the superiority of one technique over the other or suitability of a technique for a particular country, but there is no denying of the fact that this 'choice of technique' is of paramount importance in developmental planning of developing countries. And it is because of this importance

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[13] G.Ranis and Fei: "Innovation, Capital Accumulation and Economic Development", American Economic Review, Vol.53, No.3, 1963.
[14] J.C.Sadesara: "On Choice of Technique in Consumer Goods Industries", Indian Economic Journal, Annual, 1957.
[15] If it is assumed that production function is continuous (neo-classical one). There may be infinite number of techniques. If isoquants are kinked (linear programming isoquants) there are limited options. Possibility of L-shaped (Leontif isoquants) is very remote.
[16] E.F.Schumacher: Small Is Beautiful, Rupa, New Delhi, 1973.

and the complexities involved that the debate over the 'choice of technique' continues right from classical political economy to modern times.

## 2.2 Classical and Neo-classical Theory

The origin of choice of technique debate can be found in classical political economy. Adam Smith's theory of the gravitation of market prices around natural prices shows the first systematic attempt to examine the process of allocating productive resources among alternative uses. However, it was Ricardo who first proposed substitution among productive resources on the basis of movements in relative prices. Karl Marx modified Ricardo's doctrine and concluded that the effects of technological change upon employment are of a cyclical nature, reflecting expansion and contraction of capital investment. Marx may be regarded as the first economist to tie up the course of technical progress and its effect upon employment with cyclical fluctuation in time. He maintained that the periodic recurrence of the cycle of depression and subsequent revival of business and employment was inherently related to technological progress.

The logical structure of the neo-classical approach of the choice of technique paradigm hinges on three premises. First, a set of technical alternatives is readily available. Second, economic agents are familiar with each of the alternatives and can compare them. Third, the act of choosing one alternative does not imply any additional cost for the producer.

The simple neo-classical approach is summarised in convex iso-product curve. Capital-intensity is defined as capital per worker (K/L ratio). Capital and labour are measurable and labour is homogeneous. Capital and labour-intensity may also be defined in terms of capital and labour required in producing one unit of output. The

two definitions, capital per worker and capital per unit of output, will rank techniques in the same order if only efficient techniques are considered. [17]

While comparing an efficient technique with an inefficient technique, the two criteria of capital-intensity may give different results with the less capital-intensive technique, in terms of capital per worker, requiring more capital per unit of output than the efficient technique. Given positive cost attached to the use of each factor it will never pay to adopt an inefficient technique.[18] The assumption of an infinite or a very large number of efficient techniques of varying capital-intensity means that full-employment may be attained with any amount of capital available in relation to labour.

The basic proposition of the neo-classical price-incentive model is quite simple. Following the principle of economy, producers are assumed to face a given set of relative factor prices and utilise that combination of labour and capital which minimises the cost of producing a desired level of output. It is assumed that a large number of techniques are available. Thus if the price of capital is high relative to the price of labour, a relatively labour-intensive technique will be chosen. On the other hand, if labour is expensive a more capital-intensive technique will be chosen. Given that most third world countries are endowed with abundant supplies of labour but posses very little capital; one would naturally expect production methods to be relatively labour-intensive. But one often finds production methods in these countries

[17] This definition of efficiency, which has been described as *technical efficiency* [Lipsey, 1966,pp. 231-232] is altogether different from *economic efficiency*, which is normally identified with least cost methods. Efficient methods, as defined here, are necessary conditions, if not the sufficient one, of least cost production where factors have positive prices.

[18] It is sometimes argued that the use of labour in a labour surplus country confers a benefit on society and not a cost. Here it is assumed that it only pays to adopt efficient technique.

highly capital-intensive. The explanation according to this school is simple. Because of a variety of structural, institutional and political factors actual market price of labour is higher than that of capital. Market prices of labour and capital are higher and lower respectively than that of their true scarcity or "shadow" values. From the private cost-minimising viewpoint of individual firms, the choice of a capital-intensive technique is correct. They are only responding to the existing structure of price signals in the market for factors of production. However, from the viewpoint of society as a whole, the social cost of under-utilised capital and, especially, labour can be very substantial [Todaro, 1977].

Thus we see that the first systematic attempt to understand the complexities involved in the question of 'choice of technique'. started from neo-classical theory only. Neo-classical theory is a 'price-incentive' model where factor prices play an important role in making of this choice. The conclusion that emerges is that relative prices of factors are the most important (if not only) determinant of 'choice of technique'. Of course this conclusion is based on some very restrictive assumptions.

## 2.3 Modern Theories

Relaxing the restrictive neo-classical assumptions and its integration with neo-Keynsianism is the hallmark of modern theory of 'choice of technique'. The central issues around which the whole modern theory has revolved are the 'two objectives' and the 'two conflicts'.

As said earlier developing countries have two important policy objectives; that is increasing output and expanding employment. To be more specific, the choice for developing countries is between maximising current output (and consumption) and

rate of growth of output (future output or consumption). These two objectives give rise to two types of conflicts, *viz.*,

(a) employment versus output

(b) employment versus saving

Modern theory of 'choice of technique' has centred on these questions. Labour-intensive technique increases current employment and consequently current consumption. But this reduces saving (with the assumption that $MPS_w < MPS_p$ and no lag between saving and investment) and consequently the availability of net surplus for future investment resulting into reduction of rate of growth of output and future consumption. It maximises current employment but with the slowing down of rate of growth of output, future employment generation is impaired. As opposed to this, capital-intensive technique reduces current employment and consequently current consumption. But with greater availability of re-investible surplus, rate of growth of output is maximised resulting in to greater employment in future and maximisation of future consumption. A related problem in this debate is regarding output effect and employment effect of labour-intensive and capital-intensive techniques.

A.K.Sen[19] has done the pioneering theoretical work in modern theory. Since Sen's approach is very similar to Maurice Dobb, it is commonly called Dobb-Sen model of 'choice of technique'. However, even before Sen many economists have thrown light on the choice between alternative capital-intensities.

N.S.Buchnan and J.J.Polak suggested the rate of turnover criterion- also known as the minimum capital-output ratio criterion. The countries engaged in development

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[19] A.K.Sen: Choice of Techniques, An Aspect of the Theory of Planned Economic Development, Oxford University Press, 1968.

should minimise the incremental capital-output ratio and maximise the productivity of capital. But this criterion is a very imperfect guide to policy. A rate of turnover does not ensure a high rate of net output because we can not rule out a very high rate of depreciation. It ignores the cost of employing labour in operating the capital [Sen, 1957]. This criterion ignores the factor of time. Moreover this criterion is not concerned with the social returns or benefits of a particular form of capital resources allocation [Kahn, 1951].

Rejecting the rate of turnover criterion, Kahn proposed the social marginal productivity criterion. Social marginal productivity is the difference between the value of total output to the society (V) and social cost (C), expressed as the ratio of investment (I), i.e., SMP = (V-C) / I. But when the social cost of labour declines to zero this criteria looses its distinction. Moreover it is static and full of practical difficulties.

Galenson and Leibenstein argued that the appropriate goal of an economy should be the maximisation of per capita output or average income, either over time, or at some time in the future. The best allocation of the investment resources is achieved by equating the marginal per capita re-investment quotient of capital in its various alternative uses. The result of such a policy would be to maximise the per capita output potential at some future point in time. But this criterion is based on the assumption that the initial amount of investment is fixed irrespective of the technique chosen. Secondly this criterion favours the maximisation of current growth rate at the expense of employment and the production of goods for current consumption. This may not be appropriate if the society values present welfare more than the future welfare [Sen, 1957].

Sen's model is, in a way, a critique of above criteria. Sen shows the limitation of these criteria and compares these with his own model. Sen begins with the problem of an investment planner who has to make a choice between various techniques. If $(m_1/m_2)$ is the ratio of the volumes of investment with technique 1 and technique 2 respectively and if $(r_1/r_2)$ is the ratio of re-investment that would be possible when the investment planner chooses the respective techniques, technique 1 will lead to a higher or lower rate of growth depending on whether $m_1r_1$ is greater or less than $m_2r_2$. But this is not enough to make a choice between the two techniques. It is very much possible that higher growths rate does not provide a higher level of social welfare. Sen argues that after getting the two time series of income flows we have to apply the relevant rate of time discount. The time discount is necessary because of two reasons: (a) the diminishing marginal social utility of income with the rising income level, and (b) the uncertainty of the future. If marginal social utility of income falls quickly and becomes negligible as income rises beyond a certain level, it is possible that higher rate of growth of income may not give us a higher sum of total social satisfaction. Sen admits that beyond a certain point these rational calculations can not be applied, because it is very difficult to foresee all that is going to happen in the future. He, therefore suggests less satisfactory but more workable method under which a period of time that is to be considered is fixed and then one should see whether the loss of immediate output due to the choice of the more capital-intensive technique is more than compensated by the extra output from it later, before the period under consideration is over. He conceives a period of recovery and defines it as the period of time in which the total output (the sum of yearly flows) with the more capital-intensive technique is just equal to that with the less capital-intensive technique.

Sen defines the capital-intensity "as the number of man-years required in capital goods sector to make sufficient fixed capital to employ one man fully in consumer goods sector".[20] According to Sen, technique L (technique with lower capital-intensity) gives a larger, equal, or smaller volume of output than technique H (technique with higher capital-intensity) in the first period depending on whether,

pc / pc' >, =, or < a / a' [condition 1]

Where,

pc = Productivity per labourer per period in consumer goods sector in Technique L

pc' = Productivity per labourer per period in consumer goods sector in Technique H

a = Capital-intensity in technique L

a' = Capital-intensity in technique H

However, it does not follow that the technique, which gives a larger product in the first period, must of necessity give a larger product also in the later period. Future production possibilities will depend on the part of the product of the first period that is reinvested. Tech L gives a larger, equal, or smaller rate of surplus than tech H, depending upon whether,

(pc-w) / (pc'-w) >, =, or < a / a' [condition 2 ]

Where, w = real wage rate per labourer per period.

Thus condition 2 gives us the condition for choosing tech L or H if we wish to maximise the rate of growth.

[20] Sen: *op. cit.*, p. 13

Sen argues that condition number (1) is not based on the assumption that it is only first period, which matters. Similarly condition (2) makes present as well as future important in any planning calculation. The second problem can be solved once the two alternative time series of consumption and employment are obtained.

There are some very serious difficulties involved in this choice of the time combination of techniques as opposed to one technique. The factors that make it necessary to study the problem in terms of time-combination are likely to make the forecasting of the future more difficult. The problem of present *vs.* future must be settled. If our horizon is limited to a definite time period (which is required for derivation of the time series), we have to answer the question of what about the terminal capital at the end of the time horizon. The value attached to future becomes important.

Galenson and Leibenstein and Dobb-Sen approach challenge, not the basic assumption of wide availability of techniques, but the optimum choice within that range. They advocate maximisation of growth of output rather than current employment. This approach recommends maximisation of saving per unit of investment. The basic idea of Sen model is that it is maximisation of rate of growth of output, i.e. future consumption, which matters. Although Sen does provide the condition required for maximising the current output or consumption but he is primarily in favour of capital-intensive techniques. He argues that capital-intensive techniques generate larger volume of re-investible surplus and consequently gain in future output is going to be much larger than loss in present output. Of course a proper time discount is required to estimate the future flow of output.

Kalecki[21] provides the maximum limit to which the capital-output ratio should be raised in order to maximise the rate of growth at the end of the period of recasting in Dobb-Sen case where rate of increase in labour productivity resulting from technological progress is zero. In the early stage of recasting, if the capital-output ratio were not raised at all, the rate of growth would be lower than that when the capital-output ratio is raised. Thus we get a higher rate of growth in the long run but we loose in the near future. In a situation of economic growth with a reserve of labour, real wages remain constant only for a rather short transition period, which make it possible, with labour productivity increasing owing to technical progress, to produce a definite increase in the rate of accumulation. The transition period being over, real wages once again begin to rise at a rate equal to rate of increase in labour productivity. This is accompanied by a more rapid increase in employment than was the case in the initial position. Kalecki argues that lower the rate of growth of productivity the greater was the chance that raising the capital-output ratio, with the reserve of labour in existence, would prove a profitable proposition. Kalecki's analysis seems to lead ultimately to the conclusion that the theory that increasing the capital-output ratio should accelerate economic growth has practically no significance in the case where there exists a reserve of labour.

So far the whole discussion on Dobb-Sen model and its subsequent criticism and modification has centred on the question of maximum output versus maximum surplus. From above it seems that the 'best' technique is one, which maximises surplus. In other words, the question of 'choice of technique' is settled in favour of

[21] M.Kalecki: Introduction To The Theory Of Growth In A Socialist Economy, Oxford Basil Blackwell, 1969.

surplus maximising technique. Of course there is difference of opinion about the characteristic of this surplus maximising technique. It looks as if there are only two types of techniques; one maximising output and the other maximising rate of growth of output via surplus maximisation. Again it is a question of the objectives of economic policy.

A.K.Dasgupta[22] finds contrasting of the two objectives, maximum output versus maximum surplus, as beside the point. Dasgupta argues that the accepted economic criterion for a policy decision is the criterion of minimum cost. Applying this criterion we might say that if for producing a commodity different alternative technique are available that technique is to be chosen which conforms to the principle of minimum cost. The condition of minimum cost is an equation between wage rate and, marginal productivity of labour. At what technique would the condition be fulfilled, the real problem lies here. It depends upon what wage rate we take in to account. If we go by the market wage rate the relevant technique would entail lower output and employment. If on the other hand, we go by the opportunity cost principle and equate the price of labour with social cost and further assume, in view of the existence of unemployment, that the social cost of employment is zero, the relevant technique is the technique where $MP_L$ is also zero.

Thus we see that Dasgupta is not discarding the two criteria, namely maximisation of output and maximisation of rate of growth of output via maximisation of surplus. Dasgupta has attempted to weave the criterion of minimum cost in to this, in an attempt to achieve both of the objectives.

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[22] Dasgupta: *op. cit.*, 1958

Given the initial stock of capital and a well-behaved neo-classical production function the labour-intensity should be chosen at which the marginal productivity of labour is equal to marginal social cost of labour or the shadow price of labour. The first generation of the economists on the subject (Polak, Buchanan, and Kahn) measured the social cost of labour by its social opportunity cost, which is defined as the loss of output in other fields when a unit of labour is withdrawn from them for employment in the project in question and appropriate readjustment have been made in the industries losing labour. The opportunity cost of labour is, by assumption, nil in labour-surplus economy. Therefore, labour-intensity of the project should be extended to the point where marginal productivity of labour is zero. This, it was argued, will maximise both total output and investible surplus.

This kind of argument has been criticised by Sen, Dobb, Marglin and others. The key point emphasised by Sen (and others) is that in an economy with sub-optimal saving rate the real social cost of labour will not be zero but positive and this cost will equal the 'extra consumption induced by an extra unit of employment' in a labour surplus economy with sub-optimal saving rate Accordingly, this marginal social cost of labour must be compared with the marginal productivity of labour to arrive at the socially optimal labour-intensity. If the marginal productivity of labour is less than the marginal social cost of labour an extra unit of employment will add more to consumption than to output, eat into investible surplus or total saving of the economy and affect adversely the growth rate and thereby future consumption. Hence, beyond this point of labour-intensity a conflict arises between current employment and future employment. Labour-intensity could be increased further and more labour employed with the given stock of capital in the present only at the cost of future employment.

### 2.3.1 Conflict (or No Conflict) Hypothesis

While choice of present consumption versus future consumption and present employment versus future employment are rooted in the core of 'choice of technique' debate, the question of selection of objectives is also involved here. Developing countries have three broad objectives: to raise the level of present consumption; to raise the level of future consumption (by saving now), and to raise the level of employment. In the choice of new techniques, a conflict between objectives may arise. First, a technique, which maximises employment, may involve a sacrifice of output. Secondly, a technique, which maximises employment, may involve a sacrifice of saving. We shall argue that while in theory there may be a conflict, the assumptions on which a potential conflict is based are either invalid or too extreme, and that in practice societies could move towards the use of more labour-intensive techniques without sacrificing the level of present or future consumption.

#### *2.3.1.1 Employment vs. Output*

A potential conflict between employment and output exists in the choice of new techniques because methods, which employ high labour-capital ratio, may involve high capital-output ratio because labour productivity is lower. The empirical evidence on this are not conclusive. Maximising output involves using scarce resources as efficiently as possible. If capital is the scarce resources, it involves minimising the capital/output ratio. The type of production this requires may be, but need not be, consistent with maximising employment [Stewart & Streeten, 1971].

This conflict arises because the more labour-intensive method, which uses lower capital/labour ratio or shows lower cost per work place, actually involves more capital per unit of output than the capital- intensive method. Theoretically it should

not have happened. But this happens because methods of production are developed over a historical time period. Second reason why this sort of situation develops is the existence of economies of scale.

Implicit in this is the assumption that there is a specified level of employment associated with each technique. There is a minimum amount of employment associated with a machine. Above this minimum, employment is variable. But there is almost always an upper limit to the output level attainable as more labour is employed. So long as the output is responding positively to the additional workers the level of employment associated with a given machine may depend partly on the level of wages. Even where output is invariant with respect to the employment the actual employment associated with given machinery may depend partly on real wages since managerial effort may be substituted for employment as real wages rise. Thus the employment level associated with any given machine may not be independent of the wage rate.

There is thus a limited range of employment possibilities associated with each machine or for any positive real wage there comes a point at which it is no longer worthwhile employing extra worker with a particular machine. This means that there can be conflict between output and employment. This is independent of any institutional or other lower limit on the level of real wages.

Just as some economists assume that such a conflict between output and employment can not arise, others assume not only that it has arisen in the past, but also that it necessarily must arise. The capital-intensive methods of production, it is claimed, will always involve lower capital costs per unit of output (and higher costs

per work place) than the labour-intensive methods[23]. This position is as extreme as the other is. There is considerable evidence that in many industries and in much process, the more labour-intensive methods also save capital per unit of output[24]. The argument here is that the more labour-intensive methods also save capital per unit of output in these cases and therefore maximising current levels of employment and output are consistent.

There is a conflict between maximising current employment (which involves choosing the technique with higher labour requirement and lower capital requirement per unit of output) and maximising the growth of output and employment. However there is no conflict between maximising the growth of employment and output, both of which involve the same technique. The conflict between current employment and the growth of employment worsens as the wage level increases. As the wage increases the capital-intensity of the technique which maximises the growth of output and employment increases (increasing the conflict between current and future employment), while the maximum attainable growth rate declines. If we drop the neo-classical assumption of rising capital/output ratio as the capital-intensity of the technique increases the most capital-intensive technique available maximises the growth rate, irrespective of the wage rate.

[23] See, for example, N. Kaldor in Ronald Robinson (ed.), Industrialisation in Developing Countries, published by the C.U.P., Overseas Studies Committees, 1965, pp. 28-9: There is no question of the superiority of the latest and more capitalistic technologies. Similar emphasis on overall superiority of the capital-intensive techniques is found in S. Amin, "Levels of Remuneration, Factor Proportions and Income Differentials with special reference to Developing Countries" in Wage Policy Issues in Economic Development, ed., A. Smith, Macmillan, 1969, pp 269-92.

[24] A.S.Bhalla, Economic Journal, 1964, suggests that the capital/output ratio for traditional spinning methods, as opposed to the Ambar Charkha , may be lower than for factory methods. A.K.Sen, Choice of Technique, Appendix C, suggests that in cotton weaving the capital/output ratio is the lowest for the most labour-intensive technique, the fly-shuttle hand loom, and highest, nearly 2.5 times as big, for the automatic power loom (again including working capital). See also Bhalla: "Choosing Techniques - Hand Pounding vs. Machine Milling of Rice, An Indian Case", Oxford Economic Papers, March 1965.

Both production and employment occur in time and stretch in to the future. Therefore the problem of timing is important. Sacrifices now may yield gain in the future. There are two opposite set of circumstances: first, where less production and more employment now leads to more production later than would otherwise have been possible; second, where less employment and more production now leads to more employment later than would otherwise have been possible [Stewart & Streeten, 1971].

In the first case, the greater current employment opportunities, the greater is future productive capacity. The second case works in opposite direction and possibly the most important way in which an apparent conflict between output and employment arises. Here we maximise production in the short run, even though it means tolerating more non-employed now, because the extra production enables us to generate more jobs later than would otherwise have been possible. If there is a current conflict between output and employment, it must be remembered that output is useful not only for itself, but can be used to generate more employment. To raise employment means sacrificing not only output now but also the rate of growth of employment. This means that at some future date the level of employment will be lower than it would otherwise have been. The choice presents itself as one between different time paths of output and employment. It is thus partly a question of our time preference towards both output and employment.

Planners must know not only their preference between the present and the future, for both output and employment, but also what opportunities there are for trade-offs. Conflicts between current levels and growth rates of output and employment may arise either because growth rates are determined by saving rates,

saving rates by income distribution and income distribution by employment levels, or because growth rates are determined by the allocation of a given saving ratio between sectors and this allocation influences the level and growth of employment.

It is common to assume in this context that a capital-intensive technique leads to a higher saving ratio for the same income level than a labour-intensive technique. On this assumption, lower employment now can give faster growth of output and employment. Those who make this assumption assume

(a) That a higher proportion of profit is saved than of wages and consumption makes no contribution to future growth.

(b) That wage rates do not depend on the technique

(c) That the government is incapable of securing the saving ratio it desires by taxing the wage earners and generating adequate public savings or using inflation to reduce real wages.

For any given capital-intensity of technique and in the absence of technical progress, the growth of employment is determined by the growth of output. Assuming all wages are consumed and all profit saved, the technique which maximises the growth of output (and also employment) will depend on the wage level [Stewart & Streeten, 1971].

*2.3.1.2 Employment vs. Saving*

The conflict between employment and saving can be illustrated in its starkest form using a simple production diagram, first used in this context by Dobb [1955] and Sen [1960].

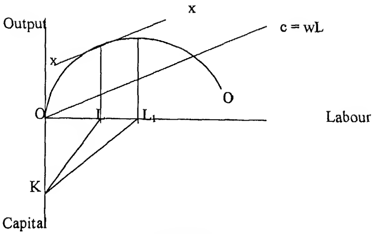


*FIGURE 2.1*

Considering the use of a given amount of investible resources OK and the possibility of employing those resources with varying amount of labour to produce output, OO is the production function in the consumption sector exhibiting diminishing returns to labour. Now taking the standard traditional assumption that in the industrial sector labour is paid a fixed wage which is all consumed so that a ray from the origin (OC) with a constant slope (w) shows the level of the wage bill and consumption at each level of employment.

The difference between OO and OC is profit; and if all profits are saved the difference also shows the level of saving at each capital-labour ratio. Saving is maximised where a line drawn parallel to OC is tangential to the production function- at employment level OL in figure 1. Beyond this point further employment generation would diminish the level of saving and investible surplus. If the production function in the figure is denoted algebraically as:

$$O = aL - bL^2 \qquad ...(1)$$

And the saving function as:

$$S = aL - bL^2 - wL \qquad ...(2)$$

The level of employment, which maximises saving, is obtained by differentiating equation (2) with respect to L and setting equal to zero which gives:

$$\partial S/\partial L = a - 2bL - w = 0 \qquad ...(3)$$

Therefore the level of employment, which maximises saving, is:

$$L = (a - w) / 2b \qquad ...(4)$$

And the level of employment, which maximises output, is

$$L_1 = a / 2b \qquad ...(5)$$

Since $L < L_1$, there is a conflict between saving and employment maximisation. The more labour-intensive technique maximises output and consumption in the short run and the more capital-intensive technique provides a greater surplus for reinvestment for growth and future output and consumption.

The potential conflict between increasing employment and maximising saving, as represented by the difference between $L_1$ and L in above figure, is based on several assumptions, the validity of which may be questioned.

Some economists have favoured the combination of labour-intensive and capital-intensive techniques. The case for the use of 'joint technique' is based on the fact that there exists in different industries only a limited number of fixed proportion techniques. If there were an infinitely large number of techniques it would be possible to hit upon a single optimum technique which would give the best result. It is because of discontinuities in isoquants that we have to resort to the use of joint techniques. The best policy under the circumstances would be to expand the labour-intensive sector and to allow the capital-intensive modernised sector to expand along with labour-intensive sector only after a proper balance between the two has been achieved. It may be argued that the existing techniques are so limited in number that

their capital-intensities show such a wide variation that it is not possible to find an optimum combination of these techniques at any level. Even if such a combination were possible, it would not make much difference in reality.

An other stream pioneered by Schumacher and followed by Dickson, Sen, Harry Johnson, Makhajani, Reddy and Vinod Vyasulu is an attempt to maximise the work opportunities for the unemployed and under-employed in contrast to modern technology which tries to maximise output per person employed. This approach suggests the adoption of labour-intensive small-scale technologies with a view to maximise the current employment. This approach advocates adoption of 'intermediate technology'. Explaining this line E.F.Schumacher has advocated 'intermediate technology' for developing countries. Many developing countries have to battle with twin evils of mass unemployment and mass integration in to cities. Schumacher calls it a 'process of mutual poisoning'. To fight against these twin evils, Schumacher advocates regional approach to development and a serious effort to develop what might be called an 'intermediate technology'. Schumacher says that the gap between traditional $1 technology and the modern advanced west technology i.e. $1000 technology – is so enormous that a tolerably smooth transition from one to another is simply impossible even if it were desirable. The task is to re-establish a healthy basis of existence for the masses by means of an 'intermediate technology' which would be vastly superior in production to this traditional technology while at the same time being vastly cheaper and simpler than the highly sophisticated and enormously capital-intensive technology of the west.

## 2.4 Parameters Affecting The Choice

The theoretical discussion provided above shows that there are many parameters, which can alter the conclusions, arrived at. The theoretical model of 'choice of technique' does not incorporate or predict with certainty the effects of changes in these parameters. It is important to note the impact these parameters (or factors) have on the model of 'choice of technique'. These parameters are basically of two types. First group of parameters are those which are based on unrealistic assumptions of theoretical models. Second group consists of parameters other than those emanating from the assumptions of the model and observed in empirical research.

Sen[25] has himself provided a detailed account of first group of parameters, operating in his 'choice of technique' model. Sen shows that there are certain assumptions in his model, which significantly affect the 'choice of technique'. Once these assumptions are relaxed, the resultant outcome could not be predicted with certainty. Sen's model is based on following restrictive assumptions.

(a) The absence of factors of production other than labour and fixed capital

(b) Constant return to scale

(c) Constant technological knowledge

(d) The absence of depreciation

(e) Equal period of gestation of equipment involving different techniques

(f) The absence of difference in quality of output ; and

(g) The absence of external economies

[25] Sen: *op. cit.*, 1968.

Sen shows that all these assumptions can be discarded from our simple model and we can still continue with our time-series approach. Of course there are following implicit assumptions which can not be so easily released.

1. The constancy of the amount of initial investment irrespective of the technique chosen
2. The whole wage bill is consumed
3. There are savings out of wages and consumption out of profit
4. The labour is no longer an unclassified homogenous block.

Sen is himself aware of the possibility of his model breaking down, once these assumptions are relaxed and these parameters start influencing the 'choice of technique' model. Sen concludes "we have introduced one complication after another to make the picture more realistic. The essence of the problem - choosing between alternative time series of commodity-outputs - perhaps remains unchanged, but the complexity of the situation is enough to make one wonder whether the problem can at all be solved satisfactorily. Perhaps it cannot - not to one's complete satisfaction anyway. But, we are likely to go closer to the solution we are looking for by bearing all these complications in mind, than by closing our eyes to them. Actually, the number of technological alternatives may be very limited in practice, and the choice between them in some cases, may look fairly obvious in spite of all these complications."[26].

Apart from the above assumptions (or parameters), there are some other assumptions as well on which the potential conflict between maximising employment

[26] Sen: *op. cit.*, 1968, p. 50.

and maximising saving is based. The validity of these assumptions is questionable. These assumptions are:

1 That the wage rate is given and invariant with respect to the technique of production

2 That all profits are saved and all wages are consumed.

3 That unemployment which results from the use of the capital-intensive techniques does not reduce the community saving to the level of saving that would prevail with more employment and a higher wage bill.

4 That consumption is not productive

5 That government lacks the ability to tax and to subsidise labour to reconcile the potential conflict.

We shall see how relaxing of these assumptions or variability of these parameters destroys the so-called 'conflict hypothesis'. The 'choice of technique' model becomes doubtful, once this 'conflict hypothesis' is destroyed. Because, ultimately this 'conflict hypothesis' is inherent in 'choice of technique' model or choice of new investment, where the labour-intensive and capital-intensive techniques are taken as mutually exclusive categories.

**2.4.1 Wage and Wage Differentials**

Let us first relax the assumption that the wage rate is given and invariant with the technique. There are two fundamental points to be made here in the context of developing countries. The first is that a great deal of the technology, at least in the modern industrial sector, is not indigenous but imported from the abroad. In this case the skill mix demanded by the technology sets the wage structure and the need to keep the labour force well nourished and contended if the capital equipment is to be

worked productively and profitably. By and large it may be expected that the greater the degree of capital-intensity the higher the average wage paid. The second point is that with large amount of disguised and open unemployment in the urban sectors of the developing countries there is likely to be a big difference between the wages that is being paid with the use of the existing technology and the wages at which labour would be willing to work given the opportunity with the use of more labour-intensive technology. If more labour-intensive technology could be developed and applied there is no reason why the wage rate should not be lower with the use of these techniques except perhaps for strong trade union resistance in certain sectors.

If the wage is not assumed to be given but may vary with technique of production, the conclusions of a conflict between employment and saving in the choice of new techniques is affected considerably. Indeed on the assumption that the marginal product of labour declines with the labour-intensity of the production and that the wage is equal to the marginal product, the conflict disappears entirely. The surplus increases the greater the volume of employment. This is obvious since under these conditions the surplus on intra-marginal units of labour increases. The formal proof is as follows.

From the production function in the equation (1) the marginal product of labour is (a-2bL). Setting the wage equal to the marginal product and substituting for w in the saving function in equation (2) gives:

$$S = a\,L - bL^2 - (a - 2bL)\,L \qquad \ldots(6)$$

Partially differentiating equation (6) with respect to L gives:

$$\partial S/\partial L = 2bL > 0 \qquad \ldots(7)$$

Thus there is no conflict between saving and employment at positive levels of employment if the wage rate equals the marginal product of labour, both of which fall with the labour-intensity of production.

We need not assume that wage is equal to the marginal product of labour. We can simply assume that the wage falls with the labour-intensity of technique, i.e. $w = f(L)$, where $f' < 0$. Now the saving function is re-written as:

$$S = a\,L - bL^2 - f(L)\,L \qquad ...(8)$$

Differentiating with respect to L and setting equal to zero:

$$\partial S/\partial L = a - 2bL - [f'(L)\,L + f(L)] = 0 ...(9)$$

The employment level, which maximises saving, is now:

$$L^* = a - f(L) / 2b + f'(L) \qquad ...(10)$$

Since $f'(L) < 0$ and $L^* > L$, the conflict between employment generation and saving maximisation is narrowed.

Presumably wages can not fall to zero. There must be some minimum below which wages can not fall. This gives the conclusion that there is no necessary conflict between employment and saving up to the point where the marginal product equals the minimum wage or where $f'(L) = 0$. Beyond that point there will be a conflict. Let us denote the minimum wages as $\bar{w}$, then using equation (2) or (8) we can find the level of employment at which a conflict sets in by differentiating with respect to L and setting the result equal to zero. This gives:

$$L^{**} = (a - \bar{w}) / 2b \qquad ...(11)$$

$L^{**}$ is obviously less than $L_1$ in figure 1, where w is assumed to be zero, but will probably be much greater than L if the market wage is considerably in excess of the minimum wage at which workers would be willing to work given the opportunity.

The cost of labour or wage rate is the most important determinant of the degree of mechanisation. The relationship between labour cost and technological choice is quite complex one. The moot point is that whether the labour cost should be valued at social cost or at market rate. How we value labour depends on whether we are interested in maximising the growth rate or the rate of immediate output. The concept of social opportunity cost is legitimate for the calculation of immediate output but entirely for that of the rate of growth of the output; the concept of the marginal extra consumption is legitimate for the latter but not for the former. The distinction is important [Sen, 1968]. If we are interested in maximising the immediate output, the relevant cost of labour is it's social opportunity cost. From the point of view of the growth rate, labour is not free and the cost of a unit of labour is equal to the extra consumption induced by an extra unit of employment. To derive the alternative sets of time series we have to use both the concepts of labour cost. It is generally said that unemployment or the availability of cheap labour in the under-developed economies provides a case for relatively less capital-intensive technique. If we are applying Social Marginal Productivity criterion this follows immediately. As far as Surplus criterion is concerned the effect is less obvious. However since the abundance of labour leads to a lower wage level, the tendency is operative in this case as well. This effect operates also in the Time Series criterion as the time series depends on the level of immediate output and the rate of growth [Sen, 1968]. But this may not be a general rule. This is so because the result may be affected by the fact that the productivity of

labour in the under-developed areas is lower, given the capital-intensity. Since we are interested not in the value of W as such but in it's ratio (Pc-w)/W, the effect of a low W in the under-developed areas may be partially compensated by the correspondingly low Pc.

The problem of wage differential also affects the technological choice. A more capital-intensive technique may involve a higher wage rate. Urban industries may have a higher wage level than the same industries in the rural areas. In comparing the surplus rate of alternative technique, this consideration has to be introduced. At the same time the possibility of a rise in the wages overtime affects the choice of technique not only in the future, but also, in the case of durable plants, the choice of technique today.

In a completely planned economy the scope of a direct manipulation of the wage rate is considerable. In this case the conflict (given a reserve army of labour) between the maximisation of immediate output and that of the rate of growth involve in technological choice disappears. In practice, even in a completely planned economy the wage rate is never fully within our control. Governed by customs, trade union pressure, immobility and incentive, the wage rate is not entirely a policy variable. The question of the technological choice has to incorporate this dimension as well.

**2.4.2 Labour Market**

As pointed out above, the form and the content of labour market influence the 'choice of technique' via changes in the wage rate. Generally labour markets are not free from imperfections. Naturally in a pure neo-classical sense, market forces do not generate the desired results in third world labour abundant countries where normally labour market is a buyer's market. In these imperfect labour markets other forces, economic

as well as non-economic, influence the wages. In the determination of 'choice of technique' labour processes are also important. Seasonal nature of wage employment or presence of casual labour will significantly affect the 'choice of technique', via the wage rate

While the existence of multiple labour markets in many developing countries significantly affects the choice of technique, the prevalence of wage gap complicates the problem further. In the case of wage systems the gap is readily noticeably in terms of difference in wage rate for the same kind of labour in different labour markets. In comparing a wage based labour market with labour use under a non-wage system, one has to be careful about defining real labour cost appropriately. For the case of 'self-employed labour' or 'unpaid family labour' the appropriate cost of labour is given by the rate of substitution between output and non-work that is acceptable to the labourer. The substitution in question is not that between person's labour and his own share of output, but that between the former and entire output produced by that unit of his labour.

### 2.4.3 Dualism

Dualism of labour market can arise from a number causes and the implications of these causes are quite different. Following are some of the possible causes that can be relevant.

1. Labourers job pertinence
2. Indivisibility in labour supply
3. Loss of share of family income
4. Labour legislation and union pressure
5. Employer's incentive for paying high wages

The economic decision processes that determine the technology and the level of employment in a given economy depend on the pattern of ownership of the means of production and the relation between the different economic classes. The dualism based on rural-urban differences is simpler in comparison to dualism within one sector itself. The family farmer could yield a higher value of labour and output per acre than the wage based farms [Sen, 1966].

One aspect of technological variation related to dualism concerns the choice of appropriate age of machinery. If there are two sectors A and B in an economy, of which sector A has a higher wage and a lower interest rate, the relative price of old and new machines that would be equilibrating from the point of view of profit in sector A would not offer the same rate of profit in sector B and this provides a case for trade in second hand machinery. The price ratios of the 'one year left' machine to the 'two year left' machine in sector A and B are respectively:

$$pa = (1+ra)/(2+ra)$$

$$pb = (1+rb)/(2+rb)$$

Since $rb>ra>0$, it is clear that $pb>pa$.

Thus an older machine is a better investment for the high investment backward sector B. the argument can be easily generalised for all periods of time. If the new and the old machines all sell in the advanced sector 'A' at relative prices such that they are equally profitable investment in sector 'A', then in the absence of transportation cost an investment in sector 'B' will always find it more profitable to buy an older machine rather than anything of a newer vintage [Sen, 1962].

### 2.4.4 Propensity to Consume of Different Classes

One of the most basic assumptions in the 'conflict hypothesis' is that the propensity to save out of profits is higher than the propensity to save out of wages. In figure 1 the difference between employment levels OL and $OL_1$ depends on the extreme assumption that all profits are saved and that all wages are spent. Both consumption out of profits and saving out of wages will reduce the conflict between employment and saving and move the point of maximum surplus away from OL towards $OL_1$. To show, this we rewrite the saving function as:

$$S = s_p (aL - bL^2 - wL) + s_w (wL) \qquad \ldots(12)$$

Where $s_p$ is propensity to save out of profit and $s_w$ is propensity to save out of wages. Partially differentiating equation (12) with respect to L and setting equal to zero gives the level of employment consistent with saving maximisation of:

$$L^{***} = [s_p a + w (s_w - s_p)] / (s_p 2b) \qquad \ldots(13)$$

If $1 > s_p > s_w > 0$, it can be seen that $L^{***}$ represents a higher level of employment than L in equation (4) or $L^{**}$ in equation (11) if w is replaced by $\bar{w}$. The narrower the difference between $s_w$ and $s_p$, the higher the level of employment before a conflict sets in, until in the limit if $s_w = s_p$, there is no conflict as long as the marginal product of labour is negative. The level of employment at which a conflict sets in will be the same. Thus we see that once this assumption is relaxed, the whole of the 'conflict hypothesis' crumbles down or its applicability becomes restricted.

### 2.4.5 Support of the Unemployed

If a particular choice of technology, which is designed to maximise the reinvestible surplus, causes unemployment, and the unemployed make claims on society's investible surplus, the surplus may ultimately be less than if more labour-intensive

technology had been chosen. There are three main ways in which the unemployed may reduce the investible surplus. If the unemployed remain in the agriculture sector they may depress the average product and consume more than they produce reducing the agriculture surplus. If the unemployed remain in the industrial sector they will absorb family saving in supporting themselves. There may be public support for the unemployed through unemployment insurance program in which case public saving will be reduced. If compensation to the unemployed in any of the form outlined above exceeds the difference between the industrial wage and the marginal product using more labour-intensive techniques, it would pay to create extra employment. This is because the difference between consumption and production as a result of expanding employment would be less than the reduction in saving caused by the unemployment. If the unemployed consumed resources equal to the value of the industrial wage, it would make no difference if labour was employed up to the point where the marginal product of labour is zero. As long as unemployment absorbs saving employment can be higher without reducing the investible surplus below what it would otherwise be. Thus as a general proposition it can be said that the extent of the conflict between employment and saving will also depend on the amount of compensation to the unemployed out of the total investible surplus.

### 2.4.6 Distinction between Consumption and Investment

The alleged conflict between employment and saving also assumes either that consumption has no investment component or that present and future consumption are equally productive. It can be shown that if consumption has an investment content and that the productivity of consumption falls as the level of consumption increases, the relative valuation of present consumption increases, favouring more labour-intensive

techniques [Thirlwall 1977]. As long as consumption is productive, an increase in employment and consumption need not be at the expense of investment for future output.

Worker's efficiency is a function of worker's consumption. To the extent that this impairs efficiency and output, an increase in present consumption may be as valuable at the margin as an extra unit of saving from the point of view of future welfare. The more equal the relative valuation of consumption and saving at the margin the less the conflict between employment generation in the present and the level of future output.

### 2.4.7 Tax and Subsidy

It has been assumed so far that saving and employment depend exclusively on the choice of technique. In practice, governments can tax and subsidise to achieve desired ends and this they can do to reconcile the conflict between employment and saving.

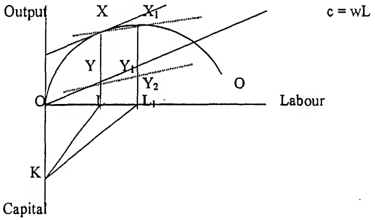


*FIGURE 2.2*

In figure 2, by the choice of technique alone, maximisation of the surplus XY means a sacrifice of employment $L_1L$ or employment $OL_1$ means a sacrifice of saving equal to $Y_1Y_2$. Now supposing that the government possesses the power to tax and subsidise.

To employ $OL_1$ requires a shadow wage of zero: that is, a subsidy to employers equal to the full value of the wage. The employer's surplus will now be $X_1L_1$, but since workers receive the market wage and all wages are consumed, consumption will still be $Y_1L_1$ and the investible surplus, $X_1Y_1$. The question is, can the tax policy in the new situation preserve the level of the surplus XY generated by the more capital-intensive technology? The answer must be yes, provided the propensity to consume is greater than zero. The total wage bill is $Y_1L_1$ and it is desired to reduce consumption out of the wage bill by $Y_1Y_2$. Consumption will fall by the amount of tax times the propensity to consume (c). Hence the level of tax raised must be $T = (Y_1Y_2) / c$. The preservation of the level of saving is accomplished while moving from the more capital-intensive to labour-intensive technique.

If a fairly high level of taxation already existed, and there was no scope for further taxation, subsidisation and taxation would not be a feasible means of reconciliation. While theoretically, a policy of labour subsidisation financed by taxation may reconcile the conflict between employment and saving, it may run in to practical difficulties over the form of taxation.

**2.4.8 Factor Price Distortion and Relative Prices**

Factor price distortion seems to be one of the major factors for increasing capital-intensity. A number of empirical investigations have been made to examine the effect of factor price distortion on the capital labour substitution. However this aspect has been neglected in India. One school of thought has supported the view that a fall in price of capital will stimulate the labour saving devices. Structural, institutional and political factors are responsible for factor price distortion. Market wage structures are relatively high because of trade union pressure, politically inspired minimum wage

laws, an increasing range of employee fringe benefits and the high wage policies of multinational corporations. In former colonial nations high wage structures are often relics of expatriate remuneration scales based on European levels of living and "hardship" premiums. On the other hand the price of capital is kept artificially low by a combination of liberal capital depreciation allowances, low interest rates, low or negative effective rates of protection on capital goods import, etc [Todaro, 1977].

The import substitution, market imperfections and credit structures have distorted factor prices and consequently capital-intensity has increased [Ridker and Harold, 1971]. Eckaus has explained that disequilibrium at the factor level may arise either because a single factor receives different returns in different uses or because the price relationship among factors are out of line with factor availabilities. Empirical studies relating to factor price distortion and techniques of production have highlighted two crucial issues, that is (i) higher wages of labour is responsible for increasing capital-intensity and (ii) the demand for the skilled workers is positively related with increasing capital-intensity.



The second school of thought does not accept the proposition that the technique of production is influenced by the factor price distortion. The factor price distortion does not lead to labour saving devices, unless because of some inherent characteristic of technology, labour saving knowledge is easier to acquire than capital saving knowledge [Salter, 1960]. The relative prices of the factors will not affect the technique even if there exists possibility of choosing from different kind of inventions [Ahmed, 1966]. Joan Robinson has firmly refuted the argument that the technique of production is determined by the relative factor prices. "When applied to a given stock of capital this is evidently absurd. Such a technique has to be in a set of physical

means of production and once created, it can not be changed just because the wage-rate rises or falls".[27]

Removal of factor price distortion is not sufficient on it's own and should constitute one of several elements in a set of measures. This may also include the establishment of appropriate institution of information collection and dissemination, action relating to transport and installation costs in addition to machine prices, and the establishment of adequate planning, organisation and implementation machinery.

**2.4.9 Product Mix**

There may not be many methods to produce identical products. In fact, there may be virtually no range of methods at all. Choice of technology may get eliminated once choice of product is made. The conventional distinction between choice of product and choice of technique is thus an arbitrary one. If product requirements are sufficiently finely specified, only one process may be possible

Most of the discussion on choice of technique is based on the assumption of identical products. However, the particular product mix to be manufactured at both intra-industry and inter-industry levels deserves serious consideration. First, it is of crucial importance for determining the employment implications of any industrialisation strategy. Secondly, whether products are well specified or not makes a difference to the issue of choice of techniques. If the product mix is varied, technical choice between one kind of method and another becomes much more complicated in practice. The productive process should be regarded as a chain in which the choice of technique at one stage helps to determine the choice at other stages. This interdependence is explained partly by speed and quality requirements.

[27] J.Robinson: "Employment and Choice of Technique" in Raj *et. al.*, (ed.) Society and Change, Oxford

Heterogeneity of products could produce differences in capital-intensity by firm size even in the absence of factor price differences. An increase in the quality of the product normally requires an increase in cost. The increased cost could result from more use of labour relative to capital, or the other way around. There is no *a priori* reason for the higher quality product to be more capital-intensive. But technologically and as an empirical phenomenon, this is likely to be so in many cases.

**2.4.10 Market Structure and Organisation**

The above discussion of variation in product quality and product differentiation brings the market form and the market structure into the picture. The choice of technique is significantly influenced by market structure and organisation, as well as by the social, economic, political and institutional environment. This is all the more so in market economies, where different private investors making technological decision are often faced with different sets of factors and product prices, thanks to the existence of structural economic dualism.

Probably one of the least researched areas, on the question of choice of technique, is the structure of product as well as factor markets. The technological choice can be different for two identical firms if the market form is different. The monopolistic advantage of a firm or an industry may encourage it to use capital-intensive technique.

The 'choice of technique' is influenced by the choice of production organisation, which is a scale variable. Large-scale production entails different organisation of production than small-scale production. So the 'choice of technique' manifests itself in 'choice of scale' of production. A large-scale production has to be

University Press, Bombay, 1977, p. 162.

capital-intensive and a small-scale production may or may not be labour-intensive. Possibility of a large-scale production organisation becoming labour-intensive is remote. This is simply because output effect of capital-intensive technique is much larger than labour-intensive technique. Secondly, unit cost of production may be subject to economies of scale. Even if unit cost of production is not showing tendency of declining with the expansion of output, a larger volume of production (and transaction) may bring in higher volume of profit, from an individual entrepreneur's point of view.

Moreover the marketing and distribution network and procurement chain of inputs will be different for large-scale and small-scale production. Inputs can be procured locally or from far away markets. The same is true about outputs. Generally small-scale, labour-intensive units are in a sub-contracting relationship with large-scale, capital-intensive units. In these two alternative systems of organisation of production working capital becomes important. Large-scale units seek out the most profitable route of procurement of inputs and disposal of outputs because of their higher working capital. This difference of organisation of production significantly affects the rate of surplus generation and consequent 'choice of technique'.

**2.4.11 Working Capital**

In discussing the problem of choosing among alternative techniques for producing a given output, attention is generally focused on investment in fixed capital without any mention of the investment in working capital. The aggregate working capital requirement may be different with each technique. Each technique, producing a particular product, may have a different length of the production period. Introduction of the working capital significantly affects the rate of surplus or the rate of growth. In

modern growth it is assumed that the lag between the application of current inputs and the sale of the resulting output is negligible so that the owners of the input can be paid out of their own product. The capitalists therefore do not have to lock-up any fund for making recurring payments. Thus the total amount of funds invested in the enterprise is fixed capital and no more. That is why in a case of this type, the rate of profit is defined as surplus per unit of fixed capital. If however the lag is one year, the wages and other recurring funds are locked-up for a full year. In this case annual recurring costs are also a part of the invested fund and thus the rate of profit or surplus should be calculated with the fixed plus the annual recurring cost as the denominator.

Sen[28] shows that the introduction of the working capital significantly changes the rate of surplus. When K.N.Raj assumes no lag the rate of surplus comes out at 300 percent[29]. By introducing lag in the same data, Sen shows that the rate of surplus varies from 10.7% to 92.3%, smaller the lag greater the rate of surplus.

Whether one should include the working capital in the denominator or not depends upon the lag between payment to owners of current inputs and the sale of outputs. If 'K' is the fixed capital, 'A' the annual output, 'R' the recurring cost and 'n' the ratio of the lag to the period for which the rate of profit is being calculated, then our formula for the rate of profit is-

$$P = A - R / K + nR$$

The inclusion of working capital will affect different techniques differently and will, in general, affect labour-intensive techniques more adversely as they are likely to

[28] A.K.Sen: "Working Capital and The Rate of Surplus", Economic Weekly, Annual, January, 1958.

[29] K.N.Raj in his article on small-scale industries (E.W., April, 1956) studied Benaras semi automatic handlooms and calculated rate of surplus by assuming no lag.

have a higher ratio of working capital to fixed capital. The lag in the production process may also be greater in the case of more primitive techniques.

Once the assumption of only one type of capital, i.e. fixed capita, is discarded and capital is considered as fixed capital plus working capital the analysis of 'choice of technique' is altered. Like capital other inputs too are not homogeneous. In reality inputs are always heterogeneous.

**2.4.12 Heterogeneous Inputs**

The simplistic choice of factor proportions between two inputs, namely physical capital and labour, does not correspond to reality. In practice, possibilities of substitution exist between labour and material inputs, between labour and working capital, between skilled and unskilled labour and etc.

Allowances need to be made for the marginal rate of substitution of intermediate inputs for labour, together with the marginal rate of substitution of capital for labour. In the conventional analysis of factor proportions only the latter is considered. Alternative techniques may have differential material requirements, thus complicating the problem of choice of technique. It is often argued that, in textiles and in other manufacturing industries as well, the use of new equipment instead of old, or the use of capital-intensive methods in general, ensures economies in the use of raw materials. There is no unequivocal evidence to support such arguments. Pack[30] demonstrates that in the case of textile industry the evidence is rather mixed. The more recent loom designs result in higher wastage levels than for the Lancashire

[30] H.Pack: "The Substitution of Labour for Capital in Kenyan Manufacturing", Economic Journal, March, 1976.

looms. It is worth noting, however, that different levels of wastage occur in weaving different types of material.

Like capital labour is also heterogeneous factor input. It is closer to reality to disaggregate labour, at least broadly, into skilled and unskilled categories. There may be complementarity or substitutability between physical capital and skilled labour. Similarly, skilled labour may be either a substitute for unskilled labour or a complement to it. A case study undertaken as part of the ILO-organised comprehensive employment mission to Kenya[31] suggests that the transition from automated to semi-automated technique may involve factor substitution not only between labour and capital but also between semi-skilled labour (used with automated techniques) and skilled supervision plus unskilled labour (used with semi-automated technique). Though rather inconclusive, the available data suggest that supervision cost per unit are lowest with more 'intermediate' technologies, but rise with greater labour and capital intensity. In the movement from capital-intensive to labour-intensive methods, there is not only a substitution of supervision for skill but also a change in the nature of supervisory skills required.

### 2.4.13 Multiple Shift Working

Sen[32] provides the effect of multiple shifts working on investible net surplus. Sen argues that even if machine wears away in half the time, double shift working would favourably affect the rate of investible net surplus and thus allow a faster rate of growth. It is however possible and also quite likely that the rate of depreciation may

[31] ILO: "A Case Study of Choice of Technique in Two Process in the Manufacture of Cans", in Employment, Income and Equality: A strategy for Increasing Productive Employment in Kenya, Technical Paper 7,

[32] A.K.Sen: "Some Notes on the Choice of Capital Intensity in Development Planning", Quarterly Journal of Economics, November 1957.

be less than doubled by double shift working. Some depreciation is independent of the flow of output (a piece of land). Labour cost per unit of output is almost certain to rise as a result of a rise in the wage rate due at least to two factors – 1:the very considerable expansion of employment opportunities and 2:the disutility of working at odd hours. This effect works against the lower fixed cost per unit of output. In developing countries this effect may not be important because of large unemployment. But what happens when the saving of capital cost is compensated by a rise in the recurring cost? Even in this case there would be higher rate of surplus creation. The advantage of getting more employment immediately is also there to reinforce the case. Of course this is only a credit side of the story. The debit side has to be really strong.

**2.4.14 Risk and Uncertainty**

Firms maintain greater excess capacity and higher inventory stock under condition of uncertainty, thus leading to a higher degree of capital-intensity. One hypothesis put forward is that the capital-intensive plants seem to act as an insurance against risk. This may happen in two ways, namely (a) the manager of a capital-intensive firm may enjoy a greater flexibility in responding to unexpected demand fluctuation, and (b) the capital-intensive plant may make it easier to cope with a future liquidity crisis. The issue of uncertainty is particularly important in case of second hand machinery because of the special organisational features of the market for second hand equipment. The risk element and uncertainty are linked to imperfect knowledge about other technical possibilities

Most of literatures on choice of technique have paid very scanty attention on dynamic nature of technological progress. A "major weakness of.... Micro-studies are their static nature. This means that the studies become obsolete as fast as the machines under examination"[33]. The more recent trend, however, is towards study of technological issues in a dynamic perspective, that is, looking into the way technological changes take place over time, and influences these changes have on the modification of known technologies [Stewart & James, 1982].

The literature available on 'choice of technique' is basically of two types. First group of literature deals with macro-economic framework of an economy, where macro-economic parameters have been used to find out the effect of technology on aggregate economy. The second group of literature is those doing micro-economic studies. There is good number of works on the former. But surprisingly there is dearth of work on the second type of analysis. The former type of analysis do provide sound theoretical underpinnings but research based on macro-economic approach does not seem promising and, therefore, future research will have to be concentrated on specific industry studies and in particular on existing methods of production [Tinbergen, 1958].

[33] Frances Stewart: "Introduction" in Gareth Jenkins: Non- Agricultural Choice of Technique: An Annotated Bibliography of Empirical Studies, pp. 4-5.

*CHAPTER: THREE*

# CHOICE OF TECHNIQUE: IN PRACTICE

A theory is formulated on certain assumptions. The conclusions drawn from the theory are subject to variability and flexibility of parameters involved. This is what we have seen in the last chapter where the issues have been delineated. It remains to be examined how these parameters behave in real life. In this section we aim to test the empirical validity and practical significance of these parameters.

## 3.1 Capital - Output Ratio

The most important issue affecting the 'choice of technique' is capital-output ratio. This is supposed to be a function of capital-labour ratio and productivity of labour. Capital-labour ratio measures the degree of capital-intensity. Bhalla[1] calculates capital-output, capital-labour and capital per unit of value added for three techniques of spinning.

I. Traditional cotton spinning and Khadi

II. Ambar Khadi and Charkha

III. Factory spinning

[1] A.S.Bhalla: "Investment Allocation And Technological Choice- A Case Of Cotton Spinning Techniques", Economic Journal, Sept. 1964.

TABLE 3.1

| Technique | Capital per unit of value of Gross output K/O, Rs | | | | Capital per unit of value added, K/V, Rs | | | | Capital per unit of labour employed, K/L, Rs 1000 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | a | b | c | d | a | b | c | d | a | b | c | d |
| I | 0.40 | 0.52 | 0 66 | 0.79 | 1.61 | 2.64 | 4.42 | 6.64 | 0.50 | 0.07 | 0.08 | 0.10 |
| II | 0.96 | 1.10 | 1.26 | 1.42 | 3.84 | 5.54 | 8.44 | 11.80 | 0.17 | 0.19 | 0.22 | 0.25 |
| III | 0.75 | 0.83 | 0.92 | 1.02 | 2.83 | 4.19 | 5.80 | 8.57 | 16.13 | 18.03 | 20.0 | 22.10 |

*Source:* A.Bhalla, 1964.

Bhalla defines capital-intensity in terms of the most economical use of capital. In the above table K/L ratio is highest in technique III and lowest in technique I. Thus in terms of all different interpretation of capital-intensity the existing technique I and not the new technique II is the most capital-economising. Bhalla calculates rate of surplus per unit of capital as following.

A comparison between table 3.1 and table 3.2 reveals that there is a close correlation between K/L ratio and rate of re-investment. The highest K/L in technique III goes with the highest rate of re-investment. However capital-intensity expressed in terms of K/O and K/V does not have any definite relation with the rate of re-investment. Bhalla suggests that the capital output ratio for traditional methods of spinning, using ambar charkha, may be lower than for factory methods. This analysis highlights the inadequacy of capital-output ratio as a measure of degree of capital-intensity. This also shows that a high capital-output ratio may not give a high rate of reinvestment.

TABLE 3.2

| Technique | Rate of surplus per unit of capital, (%) | | | |
|---|---|---|---|---|
| | a | b | c | d |
| I | -87.3 | -78.4 | -72.1 | -65.5 |
| II | 71.7 | -67.9 | -64.7 | -69.8 |
| II | 13.3 | 4.3 | -0.9 | -4.9 |

*Source: Ibid.*

Sen[2] suggests that in cotton weaving the capital output ratio is the lowest for the most labour-intensive technique, the fly-shuttle handloom, and highest for the automatic power-loom.

The aggregate capital-output ratio (C.O.R.) is generally used to measure the relationship between capital and output and efficiency of different industries and techniques. Higher the ratio less the efficiency and vice versa. The relevant issue is whether COR is lower in small industries and labour-intensive techniques than large industries and capital-intensive techniques.

Some economists have come to the conclusion on the basis of their empirical findings that large industry and capital-intensive techniques have high capital-output ratio (low capital productivity) and high labour productivity. Muller and Zevering[3] have examined this issue in relation to the industries of Japan for the year 1957. The result shows that with the exception of the smallest, capital-intensity and capital-output ratio increases at each step in the size bracket. Even in the United Arab Republic the C.O.R. is substantially lower in the enterprises employing between 10

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[2] A.K.Sen: Choice of Technique, Appendix C, O.U.P., 1968.

[3] P.Muller and K.H.Zevering: Employment Promotion Through Rural Development, A Pilot Project in West Nigeria, International Labour Organisation, Vol.100, No.2, 1969, p. 410.

and 49 workers than those are with 500 or more workers. Dhar and Lydall's study is based on CMI data and perspective planning division studies. It reveals that for enterprises employing less than 20 workers the output-capital ratio is generally more favourable than those immediately above them, but necessarily more favourable than large enterprises. Prasad and Rao[4] have compared small vs. large industries and have found that capital-intensity and COR are higher in large industries. Mehta[5] has also come to the conclusion that capital-intensity and labour productivity is positively related and COR tends to increase with the size of the industry. Raj Krishna and Mehta have supported the hypothesis that capital-intensity and labour productivity is positively related and COR has increased with the increase in capital-intensity.

Some empirical studies have argued that small industries and labour-intensive techniques have high COR. Bhalla's[6] study shows that cottage industries do not have lower COR and lower capital-labour ratio than the factory sector. Sandesara[7] has criticised the premises of the Sixth Plan and the proposition that small industries use less capital and provide more employment per unit of capital. Mortwaz[8] in his excellent survey article has remarked that labour-intensive techniques do not have lower COR. Even if there are two factors of production, labour-intensive technique is

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4 K.Prasad and T.V.Rammohan Rao: Employment Potentiality of Manufacturing Industries: A Case Study of Uttar Pradesh, 1977, Sterling Publishers, New Delhi, p.7.

5 B.V.Mehta: "Size and Capital Intensity in Indian Industry", Bulletin of the Oxford University Institute of Economics and Statistics, Vol.31, 1969, pp.189-204.

6 Bhalla: *op. cit.*, 1964.

7 J.C.Sandesara: "Small Industry Production in 1982-83: A Quick Comment", Economic and Political Weekly, Vol.13, No.17, 1978.

8 D.Mortwaz: "Employment Implications of Industrialisation in Developing Countries, A Survey", Economic Journal, Vol.84, 1974, pp.491-542.

not necessarily capital saving. I.L.O. study[9] shows that in a number of cases some techniques that use more labour also use more capital per unit of output. Thaper[10] has compared K/L ratio and COR in small and large units and concludes that while capital-labour ratio is low in small units and labour productivity is high in large units, high COR is found in large as well as small units. Kurihara[11] holds that the aggregate capital coefficient may tend to be higher in labour-intensive method of production than capital-intensive one. Klein and Kosobud[12] have estimated the saving income ratio, COR and capital-labour ratio. The results show a significant downward trend of the COR with the increase in the capital-intensity.

Anderson[13] has examined the hypothesis that COR rises with industrialisation and demonstrates that COR in many industries rose sharply during 1879 to 1919 but fell almost from 1919 onwards; hence they are negatively related. Dhar's supports the constancy of COR and concluded that capital-intensity in most of the industries has increased while COR has not changed in the similar way. Hashim and Dadi[14] have quoted two studies, which support the hypothesis of constancy of COR. For example, Hoffman has concluded that the capital-output ratio during 1815-1913 exhibits a relatively high long-term stability, with no marked trend in direction. While Domar

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[9] International Labour Organisation: Employment Objectives in Economic Development, Report of Meeting of Experts, Geneva.

[10] S.D.Thaper: "Small Scale vs. Large Scale Industries", Economic Weekly, Vol.10, 1958.
[11] K.K.Kurihara: "Technique for Maximum Growth and Employment", Economic Weekly, 1957.

[12] R.L.Klein and R.F.Kosobud: "Some Econometrics of Growth: Great Ratios of Econometrics", The Quarterly Journal of Economics, Vol.75, No.2, 1961, pp.173-98.

[13] Paul S. Anderson: "The Apparent Decline in Capital Output Ratios", Quarterly Journal of Economics, Vol._, No.4, pp.615-34.

[14] S.R.Hashim and M.M.Dadi: Capital-Output Relation in Indian Manufacturing, 1946-64, The M.S.University of Baroda, 1973.

finds for the U.S. that for the period 1869-1955 (i) the coefficients were rising from the beginning of the period until the 1920s and falling thereafter and (ii) on the whole and with the exception of the 1930s the average coefficients were quite stable. Leibenstein[15] has examined the relationship between incremental COR and growth rate. The results reveal that incremental COR is higher for countries with low growth rates than for those with high growth rates. The ICOR is a function of growth rather than the other way round.

## 3.2 Output and Employment

There is a trade-off between output and employment. Output now or later is the main issue. In underdeveloped areas the conflict is due to factor price distortion and structural disequilibrium at factor level [Eckaus, 1961]. Mazumdar[16] has expressed that the present capital stock and wage fund is important reasons for the conflict. Berry[17] showed that the consumption pattern prevailing in developing countries is one of the crucial factors responsible for increasing unemployment. The unequal income distribution leads to such consumption patterns which themselves stimulate the sophisticated technique.

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[15] Harvey Leibenstein: "Incremental Capital Output ratio and Growth Rates in the Short Run", The Review of Economics and Statistics, Vol.48, No.1, 1966, pp.20-27.

[16] S.Mazumdar: Employment Planning: Problem, Strategy and Constraints, The Indian Journal of Labour Economics, Vol.20, No.1-2, 1977, pp.43-52.

[17] R.A.Berry: Factor Proportion and Urban Employment in Developing Countries, I.L.O., Vol.109, No.3, 1973.

Most of the empirical studies have supported the phenomenon of growing gap between output and employment. Sethuraman[18] has examined the trends of growth of output and employment for the large scale-manufacturing sector in India for the period 1950-64. The empirical findings show that employment has grown at an annual rate of 6% or little more, while the real value added has increased at an annual rate of 10% and the capital stock at an annual rate of 17%. Thus the growth of employment has lagged behind the growth of value added and capital stock. Warner and Harvey have examined the issue of industrialisation and employment in developing countries. The findings show that the employment has increased merely by 1% in manufacturing sector in India between 1951-61. The increase in capital-intensity in new industries as well as in traditional and labour-intensive technique, modernisation of capacity in a more modern way and rigid factor problem are seen to be the main factor responsible for the conflict. Planning Commission has also taken note of the conflict between output and employment in Draft Sixth Five Year Plan--1978-83. Investment and output have grown at a high rate but the product mix and the technique mix have been so capital-intensive that employment did not grow *pari passu.* Between 1961-76, in the modern factory sector, investment increased by 139% and output by 161% but employment increased only by 71%. Thus employment per unit of capital declined by 28%. Mitra[19] has examined the trend between value added and employment in the Indian manufacturing sector for the period 1960-65. The empirical finding reveal that the output has increased by 59 points but employment increased only by 36 points

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[18] S.V.Sethuraman: "Prospects for Increasing Employment in Indian Manufacturing" in Ridker and Harold (ed.) Employment and Unemployment, Vikas, Delhi, 1971

[19] A.K.Mitra: "Employment in Manufacturing Industry, An Analysis of Growth Rate and Trend (1960-70)", Arth-Vijnana, Vol.16, No.1, 1974.

between 1960-65. The trend rate of growth between value added and employment was 9.0% and 6.4% respectively. Bhalla[20] in his study of hand pounding vs. machine milling in India shows that the conflict is inevitable. The former is superior only in respect of employment generation since greater employment does not lead to a greater corresponding increase in total output. Ranis[21] has examined output and employment trend in the 1970s and come to the conclusion that the employment has lagged behind output and the elasticity of employment with respect to output is not only low but has been falling. The erroneous strategies pursued by the government for maximising the output has resulted in capital deepening. Jeffery[22] has examined the growth of output and labour absorption in Philippines. The empirical findings show that the labour absorption in the Philippines is very low due to the low employment elasticity with respect to output, a shift in industry output structure in favour of capital intensive products, a rise in real wages, cheap capital, labour saving bias in technical change and a very slow response of employment to capital accumulation.

According to some economists the goal of maximisation of output and employment are not incompatible. Both can be achieved at the same time or the gap between the two can at least be minimised. Ranis and Fei[23] have examined the employment trend in the industrial sector. Their main conclusion is that the labour

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[20] A.S. Bhalla: "Choosing Techniques - Hand Pounding vs. Machine Milling of Rice, An Indian Case", Oxford Economic Papers, March 1965.

[21] G.Ranis: "Output and Employment in the 1970s: Conflicts or Complement", in Ridker and Harold (ed.) Employment and Unemployment, Vikas, Delhi, 1971

[22] Jeffery Williamson: "Capital Accumulation, Labour Saving and Labour Absorption, Once More", Quarterly Journal of Economics, Vol.85, No.1, pp.40-65.

[23] G.Ranis and Fei: "Innovation, Capital accumulation and Economic Development", American Economic Review, Vol.53, No.3, 1963.

absorption is the inverse function of higher innovational intensity and is positively related with labour using bias. Japan and other countries have succeeded to avoid the conflict by using the labour using bias in innovation. Stewart & Streeten[24] and Franklin[25] too have supported 'no-conflict' hypothesis.

Pack[26], using UN data on capital per unit of output (K/O) and labour per unit of output (L/O) for six commodities in sixteen firms across ten countries, plots the observation of K/O and L/O (as in figure 1) for each commodity from the cross section data, and then defines the efficiency frontier to estimate the elasticity of substitution along it. Each scatter point in figure 1 represents country observations for one industry for relative amounts of capital and labour employed per unit of output. The efficiency frontier (or unit isoquants) is drawn through the points closest to the origin and the elasticity of substitution is calculated as:

$$(K/L)_i / (K/L)_j = [(W/r)_i / (W/r)_j]^{\sigma}$$

Where W/r is wage rental ratio, i and j are the two observations closet to the origin, and $\sigma$ is the elasticity of substitution. For five of the six commodities there is a large difference in the amount of capital per man-year used by countries on the efficiency frontier and a fairly high elasticity of substitution. The results are shown in table 3. The results suggest that for countries using large amount of capital per unit of labour, there are more labour-intensive techniques available that could be adopted without

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[24] F.Stewart and P.Streeten: "Conflict Between Output and Employment Objective in Developing Countries", Oxford Economic Papers, Vol.23, No.2, 1971, pp.145-68.

[25] E.E.Franklin: "Employment and Unemployment, Views and Policies, 1919-69, International Labour Review, Vol.99, No.3, 1969, Geneva.

[26] H.Pack: "The Employment-Output Trade-Off in LDCs - A Microeconomic Approach", Oxford Economic Papers. November 1974.

sacrificing output unless the co-operating factors associated with the increased labour-intensity are not available. One interesting observation from Pack's work is that India is invariably either on, or close to, the efficiency frontier using labour-intensive techniques effectively.

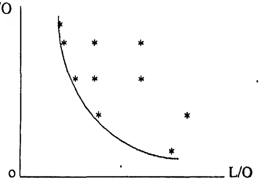


*FIGURE 3.1*

TABLE 3.3

| Industry | Countries on the efficiency frontier | Capital per man-year ($) | Elasticity of substitution |
|---|---|---|---|
| Bicycles | India | 400 | 0.24 |
| | Japan | 520 | |
| Grain milling | Japan | 280 | 3.7 |
| | Israel | 6410 | |
| Paints | India | 214 | 1.6 |
| | Middle Europe | 2790 | |
| Tyres | Iran | 6240 | 1.5 |
| | Mexico | 10600 | |
| Cotton textiles | India | 1100 | 2.0 |
| | Mexico | 8240 | |
| Wollen textiles | India | 260 | 1.2 |
| | Japan | 4600 | |

*Source:* H.Pack: "The Employment-Output Trade-Off in LDCs - A Microeconomic Approach", Oxford Economic Papers. Nov 1974.

Pack's[27] study of 42 plants in Kenyan manufacturing also suggests that there appears to be considerable ex ante choice of capital-intensity in most industries, particularly outside the processing sector in the auxiliary activities of material receiving, material handling, packing and storage of the finished products. In fact, many auxiliary activities are already very labour-intensive, and contrary to the conventional wisdom it was found that foreign owned firms generally used more labour-intensive techniques than indigenous firms did. Pack ascribes this to the better managerial expertise and technical training of personnel in foreign firms. Forsyth and Solomon[28] in their study of Ghana also find scope of capital-labour substitution and find no over-whelming evidence that foreign firms are more capital-intensive than resident expatriate is or private indigenous firms are. The situation varies from industry to industry.

### 3.3 Size of Industry, Factor Prices and Factor-Intensity

Various hypotheses have been tested empirically in the literature on the size of industry and factor intensity. First group of literature favours large industries and capital-intensive techniques. Joan Robinson[29] compares three techniques- (1) handloom (2) semi-automatic loom and (3) fully automatic loom and concludes that Technique 2 is superior so far its employment potentiality is concerned, while more surpluses can be generated from technique 3. Bhalla[30] compares three techniques of

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[27] H.Pack: "The Substitution of Labour for Capital in Kenyan Manufacturing", Economic Journal, March 1976.

[28] D.Forsyth and R.Solomon: "Choice of Technique and Nationality of Ownership in a Developing Country", Oxford Economic Papers, July 1977.

[29] J.Robinson: "Choice of Technique", Economic Weekly, 1956, pp.189-92.

[30] Bhalla: *op. cit.*, 1964.

cotton spinning. The results show that the rate of reinvestment is positively related with capital-intensity and it is high in factory spinning. On the other hand the existing hand spinning technique is superior to Ambar Charkha in respect of output, employment and reinvestment. Bhalla[31] compares two techniques - hand pounding vs. machine milling of rice. The empirical findings reveal that machine milling is the superior technique as surplus, rate of surplus and productivity is high. Sandesara[32] has examined the size of the industry and the factor intensity of 28 industries. The results show that small industries are capital-intensive and they have lower output, lower wage and lower surplus per worker and have also lower output and lower surplus each per unit of capital than large industries. Results pertaining to techniques of production reveal that capital productivity and surplus per capita is high in labour-intensive technique than capital-intensive one. On the basis of these results, Sandesara has concluded that for a country like India large sized units and labour-intensive techniques seem appropriate, while small sized units and capital-intensive techniques seem to be inappropriate.

Second group of literature favours small industries and labour-intensive techniques. According to this the hypotheses that saving and reinvestment is high in capital-intensive technique is not supported by empirical findings. Ranis [1962] study is based on sample survey of 530 units in Karachi. The hypothesis that all wages are consumed and all profits are saved is not supported by the findings of the study. It reveals that the relationship between the total plough-back of profit and the in-place

[31] Bhalla: *op. cit.,* 1065.
[32] J.C.Sandesara: 'Size and Capital Intensity in Indian Industry', University of Bombay, 1969.

capital stock in the medium scales are high for all industries. Shivamaggi *et al*[33] examined wages, labour productivity and cost of production for the period 1951-61. The study is based upon CMI and ASI data. The results show that labour productivity has increased due to an increase in capital-intensity and improvement in management technique. Rise in real wages, overall and industry wise, lagged behind improvement in productivity. The wage component of total industry cost was small and the wage cost ratio declined during the period. Reddy and Rao[34] have examined functional distribution in large scale Indian manufacturing for the period 1946-57. They have estimated A.C.M.S. production function and obtained the share in value added by marginal productivity theory of distribution. The results show that capital-intensity and technological change are not significantly correlated. Hashim and Dadi[35] have examined the trend of capital-output ratio and technological change in Indian manufacturing for the period 1946-64 based on CMI and ASI data. They have derived adjusted gross capital series from the book value of ASI. The results reveal the constancy of COR, an increase in capital-intensity and labour productivity, an increase in total productivity and presence of technological change in Indian manufacturing. Bakul Dholakia has measured total productivity and technological change for non-farm sector of Indian economy for the period 1948-49 to 1968-69. The contribution of capital-intensity and technological change in the growth of output is

[33] Shivamaggi, Rajgopalan & Venkatchalam: Wages, Labour Productivity and Cost of Production, 1951-61, Economic and Political Weekly, Vol.9, No.18, 1968, pp.710-15.

[34] M.G.K.Reddy and V.Rao: "Functional Distribution in the Large Scale Manufacturing Sector in India", Arth-Vijnana, Vol.4, No.3, 1962, pp.187-9.

[35] S.R.Hashim and M.M.Dadi: Capital-Output Relation in Indian Manufacturing, 1946-64, The M.S.University of Baroda, 1973.

36.2 and 63.8 respectively. Brahmanand has measured partial and total factor productivity of all sectors of Indian economy for the period 1950-51 to 1980-81. Empirical findings relating to registered manufacturing sector show a lag between growth of output and employment, an increase in capital-intensity, rising trend in labour productivity and declining trend in capital productivity. It shows that total factor productivity has increased during 1950-51 to 1970-71, but thereafter productivity has been falling. Rate of profit also shows declining trend.

### 3.4 Factor Price distortion

There have been two main approaches used to examine this issue empirically. One of these approaches has been to measure, by means of econometric estimation of aggregate production function, the elasticity of substitution between labour and capital. Although most studies have concluded that considerable substitution possibilities do exist there are serious methodological difficulties with most of these studies [Gaude, 1975]. A second approach has been to delineate the main production techniques and processes in a given industry by using micro-level data to estimate the labour-intensity of both existing and potential production techniques. These studies have generally shown a potential array of techniques of varying labour-intensity, although the most labour-intensive technique are not always the most efficient user of capital [Bhalla, 1965].

Williamson[36] [1971] has concluded that wage rate increase and capital-intensity are positively related. In the short-run one percent increase in the real wages would result in the reduction of employment growth by 0.5 percent. Theodre's study

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[36] J.G.Williamson: "Capital Accumulation, Labour Saving and Labour Absorption, Once More", Quarterly Journal of Economics, Vol.85, No.1, 1971, pp.40-65.

of Philippines shows that over valuation of Peso had the effect of distorting relative factor prices. Kennedy[37] has concluded that the choice of innovation is determined by labour and capital costs. Kesselmen[38] has examined the impact of fiscal policy on the structure of employment. He has come to the conclusion on the basis of econometric evidence from U.S. manufacturing sector that the demand for skilled worker is complementary to the capital. Sethuraman[39] has examined the impact of wage rate on the composition of employment in the Indian manufacturing sector for the period 1950-64. It shows that a relatively faster rise in the wage rate of unskilled worker has increased the demand of the skilled workers. Huq and Aragaw[40] have examined 16 sub-processes of leather industry in developing countries. The results show that the factor price distortion has not affected the capital-labour ratio. Kennedy and Thirlwall have quoted the study by Piore, which is related to a heterogeneous group of eighteen manufacturing groups. It shows that innovation ideas are not the product of labour shortages raising the costs. Labour cost does not seem to influence the technique of production in these industries.

On the empirical question of wages in relation to techniques, there is considerable evidence that wages are related to labour productivity and the type of techniques such that wages per man are higher the more capital-intensive the

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[37] C.Kennedy: "Induces Bias in Innovation and the Theory of Distribution", The Economic Journal, vol.74, No.295, 1964, pp.11-17.

[38] J.R.Kesselmen: "Formulating Fiscal Policies to Expand Employment in Indian Industry", Economic and Political Weekly, Vol.16, No.18, 1979, pp.1958-72.

[39] S.V.Sethuraman: "Prospects for Increasing Employment in Indian Manufacturing" in Ridker & Harold (ed.) Employment and Unemployment, Vikas, Delhi, 1971.

[40] M.M.Haq and H.Aragaw: "Technical Choice in Developing Countries, The Case of Leather Manufacturing", World Development, Vol.5, No.10, 1977, pp.777-90.

technique. The evidences come from a variety of sources. In a study of ten industries in India, Sandesara found that wages per worker are lower the more labour-intensive the technique. He also found that labour-intensive technology had higher output and a higher surplus per unit of capital, implying no conflict either between employment and output, or between employment and saving.

## 3.5 Working Capital

The amount of working capital required is a significant variable affecting the rate of surplus and consequently the choice of technique. This depends upon the lag.

Sen[41] shows the effect of lag, generated by working capital, on the rate of surplus, presented in table 3.4.

TABLE 3.4

| Lag | Money locked up as working capital | Total invested capital | Annual surplus | Rate of surplus per year(percent) |
|---|---|---|---|---|
| 1year | 5400 | 5600 | 600 | 10.7 |
| 6month | 2700 | 2900 | 600 | 20.7 |
| 3month | 1350 | 1550 | 600 | 38.7 |
| 1month | 450 | 650 | 600 | 92.3 |
| Negligible | 0 | 200 | 600 | 300.0 |

*Source: ibid.*

Sen shows that the rate of surplus varies with the lag from 11 percent to 300 percent.

Appavadhanulu has presented the results of a few case studies in textile weaving in order to estimate the ratio of various components of working capital. His

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41 A.K.Sen: "Working Capital and The Rate of Surplus", Economic Weekly, Annual, January 1958. Sen uses data provided by K.N.Raj (Economic Weekly, April, 1956) in his article on small-scale industry, which provoked so much discussion in 1956.

results are presented in the table below. The number of cases studied is given in the bracket.

The proportion of goods-in-process to gross output varies from 0.019 in the handloom technique to 0.043 in the factory powerloom technique and to 0.036 in the automatic loom technique. However the absolute ratio is very low in all these techniques and it would show that the influence of goods-in-process in aggregate working capital determination is very small. In contrast, it is generally seen that this ratio will be very in industries like machine tools etc. and changes in technique will influence working capital to a great extent there.

TABLE 3.5

| Technique | Goods-in-process as percentage of working capital | Goods-in-process to gross output | Goods-in-process to net output | Working capital to gross output | Working capital to net output |
|---|---|---|---|---|---|
| Fly-shuttle handloom (13) | 10 | 0.019 | 0.05 | 0.183 | 0.490 |
| Frame loom (2) | 18 | 0.040 | 0.13 | 0.215 | 0.713 |
| Pedal loom (2) | 17 | 0.027 | 0.10 | 0.159 | 0.553 |
| Semi-automatic loom (1) | 21 | 0.045 | 0.23 | 0.217 | 1.124 |
| Factory power loom (3) | 34 | 0.043 | 0.16 | 0.127 | 0.472 |
| Factory automatic power-loom (2) | 18 | 0.036 | 0.11 | 0.206 | 0.648 |

*Source: ibid.*

The differences in the ratios of goods-in-process to gross output among techniques is not very striking because the increase in the throughput volume of input is nullified by the faster rate of production in the powerloom techniques. Therefore

the period of production does not increase in the same proportion as throughput volume. From the ratio of working capital to net output it may be seen that the factory powerloom has a lower ratio. If we take in to account goods-in-process alone, the handloom has the lowest ratio. Since the estimates of the working capital are not ideally determined, and since they can not effectively take in to account the working capital held outside the individual unit, it may be more advisable to consider the ratio of goods-in-process to net output as a determining criterion.

### 3.6 MPC of Different Classes

Bhalla[42] has shown how the assumption that workers save alters the marginal calculation of the reinvestible surplus per unit of capital between techniques in his interesting case study of three cotton spinning techniques in India - two hand spinning techniques and one (relatively capital-intensive) factory spinning technique. Assuming workers do not save, Bhalla finds that the most labour-intensive hand spinning technique has the lowest K/O ratio but that the factory spinning technique has the highest reinvestment ratio. On the assumption that hand spinners do save, however, the most labour-intensive techniques are also shown to have the highest rate of reinvestment per unit of capital.

### 3.7 Productivity of Worker's Consumption

All too little is known about the precise extent to which low levels of consumption impair working efficiency and productivity.[43] But we do know that the food requirements considered by nutritionist to be necessary for efficient working are far

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[42] Bhalla: *op. cit.*, 1974.
[43] See C. Bliss and N. Stern: "Productivity, Wages and Nutrition PartI and II, Journal of Development Economics, 1978.

greater than the levels achieved by a large majority of the population in developing countries. It has been estimated by the UN-FAO that there are at least one billion people in the world suffering from various degrees of malnutrition. In this situation an increase in present consumption may be as valuable at the margin as an extra unit of saving from the point of view of future welfare. The more equal the relative valuation of consumption and the saving at the margin the less the conflict between employment generation in the present and the level of future output.

## 3.8 Choice of Technique in Selected Industries

Many studies have been conducted focussing on particular industries and the techniques or processes involved there in. These studies concentrate on selected determinants of 'choice of technique'.

Byerlee, Eicher, Liedhom and Spencer[44] have empirically examined factor price distortions prevailing in the economy of Siera Leone with particular reference to the variation in interest rate, wages and tariff between small-scale and large-scale sector. The sensitivity of the choice of technique to changes in factor prices is analysed by budget and linear programming methods. They analyse rural demand pattern to determine the demand outlook for products from labour-intensive sectors and the variation of these demand patterns by income group. They have used labour-capital ratio as a measure of the labour-intensity of production and the output-capital ratio as a measure of the 'efficiency' of the production technique with respect to the scarce factor, assumed to be capital. Output is measured as value added. To minimise output-employment conflict, such techniques are required which are labour-intensive

[44] D.Byerlee, C.K.Eicher, C.Liedhom and D.S.C.Spencer: "Employment-Output Conflicts, Factor-Price Distortions, and Choice of Technique: Empirical Results from Siera Leone", Economic Development and Cultural Change, 1983.

(i.e high labour-capital ratio) and efficient user of capital (i.e. high output-capital ratio).

The empirical results show that in many industries, techniques with high labour-capital ratios are also having high output-capital ratios, proving that there is no conflict between output and employment. One explanation for why small-scale enterprises with differing technologies can exist simultaneously in the same sector is that they do not face uniform factor price. Even within the small-scale sector there may be variation in factor prices across the industry. Rather than relying on output-capital ratio as a measure of efficiency, they have also calculated economic rate of return to capital for each of the different production technique. The result of these calculations is consistent with the findings based on output-capital ratio. Budgeting and linear programming exercises carried out to examine the effect of factor prices on the choice of technique gives two conclusions.

1. That the choice of technique is more sensitive to output prices than to factor prices.
2. Once factor prices are changed to reflect the opportunity cost of capital, the optimal production technique switches from mechanical to non-mechanical.

The analysis of factor intensities of rural consumer demand patterns weakly supports the hypothesis that employment and output are complementary within the structure of rural consumption demands. This means that redistribution of demand towards lower income groups could slightly increase the demand for labour-intensive goods and reduce the demand for capital-intensive and imported goods.

A.S.Bhalla[45] studied the technological choice in rice milling industry of India, which is characterised by 'technological pluralism'. There is a large range of variation in the degrees of labour-intensity in the hand techniques and capital-intensity in the mechanised technique of rice milling. Bhalla argues that for the purpose of allocation of given investment, the 'choice of technique' can be determined by three main criteria.

(a) reinvestible surplus given by surplus-capital ratio (S/K)

(b) total additional output and given by capital-output ratio (K/O)

(c) total additional employment given by capital-labour ratio (K/L)

Using secondary data Bhalla shows that surplus-capital ratio is higher in machine milling. The high capital-labour ratio goes with the high surplus-capital ratio in the machine milling techniques. The capital-output and capital-value added ratios in these techniques are much lower than handpounding techniques. The capital-labour ratio is relatively lower in handpounding technique. But it is expected that the productivity of labour in these techniques is also considerably lower. This goes against the common premises that in cottage industries capital-output and capital-labour ratio are lower than their factory counterparts. At the same time there is no ground to believe that the lower capital-labour ratio necessarily mean lower capital-output ratio, so that both output and employment could be maximised. The handpounding techniques score over the machine milling techniques only in respect of a greater employment potential.

[45] Bhalla: *op. cit.*, 1965.

Baily[46] examined factor market structure and technology choice in the Colombian brick industry where capital-intensity is correlated with size and firms of varying sizes and capital-intensities coexist in the long run. This pattern can be explained by the structure of capital and labour markets. The empirical evidence shows that firms do grow and sometimes do change from one category to a closely related one. But in general this study does not support the growth path hypothesis

Kanan and Spence[47] have used the social cost approach in determining 'choice of technique' in construction industry of Kerala. In order to get the social cost; a correction has to be made in market price. This can be done by opportunity cost. If there is no excess supply of skilled labour, the market wage paid to the skilled labour will be treated as the social cost of employing skilled labour. Since there is widespread unemployment, the market wage rate of skilled labour does not represent a social cost. If additional costs in the form of increased consumption are to be borne by the economy then the extra consumption element may be treated as the shadow wage rate. In that case the shadow wage rate will be greater than zero but less than the market wage rate depending on value judgement regarding the objectives of policy. Kanan and Spence have tried to correct the market price of domestic materials as well. The method of converting market values of commodity and services into social values is by way of deriving a set of accounting ratios for each input item. The accounting ratios represent the extent of overestimation / underestimation of the

46 M.A.Baily: "Factor Market Structure and Technology Choice in the Colombian Brick Industry", Journal of Development Economics, No.6, 1979.

47 K.P.Kanan and R.J.S.Spence: "A Social Cost Approach to Choice of Technology in Building Construction Industry", Economic and Political Weekly, Review of Management, Nov. 1975.

market values of inputs below the social values. According to Kanan and Spence, the choice of technology involves the selection of that technology which involves the least social cost. The use of shadow prices will lead to a social cost for the technology, which can be compared with the social cost of the alternative technologies. The technology with the lowest social cost will be that which best satisfies the stated objectives.

The most striking part of this study is its incorporation of backward linkages since the composition of input changes with the technology, they take into account the effect of this change on choice of technique. They call it direct and indirect labour component. The latter is the labour of the non-labour inputs, e.g. material and services, at each stage. To correct market rate, Kanan and Spence proposed different accounting ratios for different inputs and subsequently carry out sensitivity analysis. Three alternative techniques, all in use in Kerala, for providing a sloping roof are compared. Both solid reinforced cement concrete (RCC) and tile- on-timber are in common use, the reinforced concrete tile filler-slab (tilecrete) roof is a recent innovation. Thus, even at PWD rates, the tiled roof is to be preferred among the three alternatives. At shadow prices, the ranking is not altered, but the ratios are considerably changed. The use of the shadow-pricing technique has therefore not significantly changed the basis for decision-making in this case. It has only brought more sharply into focus the cost differences, which were already apparent even at PWD prices. An interesting result, emerging from the sensitivity analysis, is that the ranking of the alternative technologies for roofing does not change under any set of accounting ratios. This shows that even after allowing for variations in the values of

accounting ratios, the options open to us for the choice of technology on social grounds remain the same.

These studies have investigated the choice of technique in industries other than textile. Right after independence, the broader question before policy makers was the question of growth vs. equity embedded in factor endowment. In 1950s, when the process of planned development was started, the only sector of industrial structure which was historically given was textile industry. Naturally the focus of attention was on textile industry. Because of this and many other reasons, the debate on 'choice of technique' in India started from this industry only.

## 3.9 Choice of Technique in Textile Industry

Traditionally the discussion on choice of technique has been centred on labour intensive versus capital intensive technique and its desirability in developmental planning. There are few empirical studies of substitution possibilities. Because of many reasons, the existing estimates of statistical production function are not well suited to solve the issue of technological choice. The major difficulty in comparing the technique is the scarcity of engineering comparison of alternative techniques.

H.Pack[48] presents a process wise comparison of alternative production methods in cotton textile industry of U.K[49]. Pack tries to answer the fundamental question that whether older technique available in developed countries allow efficient substitution of labour for capital and if so whether such substitution is economically efficient for the less developed countries.

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[48] H.Pack: "The Choice of Technique and Employment in the Textile Industry", in A.S.Bhalla (Ed): Technology and Employment in Industry, A Case Study Approach, I.L.O., Geneva, 1985.

[49] Pack has based his calculation on data furnished by the Textile council of U.K. See Textile council: Cotton and Allied Textiles, 2vols, Manchester, 1969.

In weaving, Pack considers all the five techniques present in U.K., namely-

(i) Elitex (Airjet)

(ii) Sulzer

(iii) Lancashire

(iv) Battery

(v) Battery with Unifill

Pack, on the basis of data supplied by the Textile Council, presents a systematic economic analysis of production. Pack calculates costs of weaving shirting material with looms of different types assuming two rates of interest. Pack shows that even older machines, in this case Lancashire loom, which have higher labour intensity in comparison to newer ones, could be economically efficient at a certain wage rate, interest rate and cost of older machine as percentage of newer machine. Pack finds out the maximum amount that could be paid for the Lancashire loom as a percentage of the value of each other type of loom, if the Lancashire loom is to be competitive with it, assuming a certain wage. One problem easily overlooked in abstract discussion of choice of technique is the possibility of producing a range of products with any given set of machines. A loom that is efficient in producing one fabric may not be sufficiently flexible to allow others to be made as efficiently. Most plants (and machines) produce a considerable range of products, in each of which there may be a different relative efficiency.

Pack presents a detailed calculation for shirting and then considers the cost of producing other types of clothing. Table 3.6 shows the basic data, used by Pack, on costs per 100 yards (in dollars) for producing 40-inch cotton polyester shirting. Table 3.7 is derived from Table 3.6. In Table 3.6 in the first set of calculations, those of w*,

for the values assumed of two factor prices in the first two columns, the maximum wage that would allow the Lancashire process to break even is shown in the third column. Any value less than the assumed or calculated one would strengthen the profitability of the Lancashire loom in relation to that of the other methods. What is conspicuous about the first set of calculations, those of w*, is the quite high wage rate that would still allow the Lancashire loom to be as desirable as the others; with r = 0.09 the lowest value of w* being $653 (for the Elitex) and the highest being $1141 (for the Sulzer). With r = 0.195 the range changes to between $1084 and $1826. This suggests that even at market prices for labour, most less developed countries would be well advised to choose the Lancashire loom, if the quantities of used ones available on the world market are sufficient so that their price is not more than 10 percent of the prices of new Battery looms.

*Table 3.6*: Costs of weaving shirting material with looms of different types (Dollars per 100 yards)

| Cost | Lancashire | Battery | Battery-Unifil combination | Elitex (Airjet) | Sulzer |
|---|---|---|---|---|---|
| Space | .198 | .152 | .152 | .093 | .130 |
| Power | .385 | .397 | .397 | .385 | .250 |
| Weft waste | .035 | .035 | .035 | .408 | .290 |
| Pirning | .525 | .350 | | | |
| Capital | | | | | |
| r = .09 | .110 | 1.097 | 1.435 | 1.225 | 1.980 |
| r =.195 | .165 | 1.645 | 2.153 | 1.838 | 2.970 |
| Average total | | | | | |
| r = .09 | 1.253 | 2.031 | 2.019 | 2.111 | 2.650 |
| r =.195 | 1.308 | 2.597 | 2.737 | 2.724 | 3.640 |
| Hours per 100 sq. yds. | .0436 | .0222 | .0229 | .0163 | .0101 |

*Source: ibid.*

Of course to the extent that market interest rates are below 9 percent in a particular country the wages would have to be lower to induce a company to adopt this loom. But even at interest rates of 6 percent the value of w* would not lie below

market wage rates in many of the less developed countries. On the other hand if companies had to pay interest rates that were close to 19.5 percent, the wage at which it would still pay to adopt the Lancashire loom, assuming it was available at 10 percent of the Battery loom price, would be almost at the wage level of the developed countries.

*Table 3.7*: Alternative combination of factor prices required for Lancashire looms to be optimal in production of shirting material (assumed and calculated values)

| Type of loom compared | First set | | | Second set | | |
|---|---|---|---|---|---|---|
| with Lancashire | x | r | w* | x | r | w |
| Battery | .10 | .090 | 755 | .48 | .090 | 300 |
| | .10 | .195 | 1233 | .65 | .195 | 300 |
| Battery-Unifil | .10 | .090 | 770 | .36 | .090 | 300 |
| | .10 | .195 | 1441 | .58 | .195 | 300 |
| Elitex (Airjet) | .10 | .090 | 653 | .42 | .090 | 300 |
| | 10 | .195 | 1084 | .62 | .195 | 300 |
| Sulzer | .10 | .090 | 1141 | .61 | .090 | 300 |
| | .10 | .195 | 1826 | .74 | .195 | 300 |

Notes: x = the percentage of the 1968 new plant price which is or can be paid for a 1950 plant
r = interest rate per annum
w = wage per annum in dollars
w*= break-even wage at which the 1950 and 1968 process yield the same average cost of production
*Source: ibid.*

It would be noticed in table 3.6 that the labour-intensity per yard is more than four times greater with the Lancashire loom than with the Sulzer loom, which is the most labour-saving of those considered. Moreover, the additional labour required on the former is not more highly skilled. This is contrary to the argument that more modern equipment is a substitute for skilled labour and is therefore suitable for less developed countries.

The second set of calculations in table 3.7 is that of the maximum amount that could be paid for the Lancashire loom as a percentage of the value of each other type

of loom, if the Lancashire loom is to be competitive with it, assuming a wage of &300 per annum. The calculated values of x are generally quite high; when r = 0.09 the adoption of a simple Lancashire loom would be warranted if it could be obtained at about 36 to 61 percent of the price of the more advanced types of looms. This range changing to between 58 and 74 percent with an interest rate of 19.5 percent.

It is worth noting that even with the new looms currently available there is no sense for a less developed country in adopting something as modern and labour saving as the Sulzer. This is proved by comparing Battery and Sulzer loom. The former is using more than twice as much labour per unit of output. At r = 0.09 the value of w* at which the Battery would be equally profitable is $2086 per year and at r = 0.195 this value would be $3132- in other words far above the wages paid in less developed countries.

One problem overlooked in abstract discussion of choice of technique is the possibility of producing a range of products with any given set of machines. To illustrate this Pack analyses the production of cotton sheeting as shown in table 3.8.

*Table 3.8*: Wage required for Lancashire looms to be as inexpensive as other looms in production of sheeting material

| Type of loom | Values | | |
|---|---|---|---|
| | Assumed | | Calculated w* |
| | x | r | |
| | .10 | .090 | 189 |
| | .10 | .195 | 395 |
| Battery-Unifil | .10 | .090 | 46 |
| | .10 | .195 | 283 |
| Sulzer | .10 | .090 | 418 |
| | .10 | .195 | 792 |

Notes: As in table 3.7
*Source: ibid.*

Table 3.8 shows that when the Lancashire loom is compared with the Battery and Battery-Unifil, the break-even wage becomes $189 and $46 respectively when using a 9 percent interest rate and $395 and $283 when using a 19.5 percent interest rate. Of these $46 is certainly less than the shadow wages in probably all countries. Though even this may not be relevant in so far as w* becomes $283, instead of $46, when a more realistic rate of interest is used. Thus despite the economic efficiency of the Lancashire looms in producing shirting material, it might not be economical to use it to produce sheeting.

*Table 3.9*: Break-even wage for four types of woven material (dollars)

| | Lancashire compared with: | | | |
|---|---|---|---|---|
| | Battery | Battery Unifil | Elitex (Airjet) | Sulzer |
| A | | | | |
| x =.10, r = .090 | | | | |
| Shirting | 755 | 770 | 653 | 1141 |
| Sheeting | 189 | 46 | Not feasible | 418 |
| Zephyr | 1090 | 1258 | 439 | 972 |
| Printing | 1073 | 1012 | 347 | 913 |
| x = .10, r = .195 | | | | |
| Shirting | 1233 | 1441 | 1084 | 1826 |
| Sheeting | 395 | 283 | Not feasible | 792 |
| Zephyr | 1716 | 2169 | 863 | 1641 |
| Printing | 1654 | 1789 | 715 | 1539 |
| B | Ranking for each material | | | |
| x = .10, r =.090 | | | | |
| Shirting | 2 | 3 | 1 | 4 |
| Sheeting | 2 | 1 | - | 3 |
| Zephyr | 3 | 4 | 1 | 2 |
| Printing | 4 | 3 | 1 | 2 |
| x =.10, r = .195 | | | | |
| Shirting | 2 | 3 | 1 | 4 |
| Sheeting | 2 | 1 | - | 3 |
| Zephyr | 3 | 4 | 1 | 2 |
| Printing | 3 | 4 | 1 | 2 |

*Source: ibid.*

Given the differences in relative efficiency in producing different fabrics, it is interesting to see the values of w* for four major fabrics. Pack uses table 3.4 in which

part A shows the values of w* at two interest rates and part B ranks the values of w* by fabric. For all material except sheeting, the Elitex (Airjet) turns out to be the loom most competitive with the Lancashire. Though even here the values of w* are such as to suggest that it's adoption would be unwarranted if used Lancashire are available. Only in the production of the sheeting does the Lancashire ever require a wage likely to be below the shadow price of labour in most of the less developed countries.

Pack nicely presents some of the problems of making an optimal choice of technique in table 3.9. Supposing a semi-developed country with an opportunity cost of labour of $1000 and using an r of 0.195 is trying to choose among different type of equipment. The Airjet loom would not be economical if considerable amounts of shirting were to be produced, since the break-even wage relative to the Lancashire is $1084, and the use of the Lancashire would be optimal. The Airjet would be the correct choice for zephyr and printing material; on the other hand it can not produce sheeting at all. Thus two fabrics are produced most economically with the Airjet, one can not be produced by it at all and the fourth can be most cheaply produced with a Lancashire loom. Pack very forcefully illustrates that most plants (and machines) produce a considerable range of products, in each of which there may be a different relative efficiency. It is perfectly easy to minimise cost when the relative desirability of various products is specified, by using linear programming. But it is not possible to make choice solely on the grounds of factor proportion and factor price without having a specification of product choice. In the case considered, Pack argues that the optimal technique can not be ascertained without the knowledge of the product mix to be produced.

Pack points out that the value of w* is determined not only by differences in relative factor proportions (as above) but also by differences in intermediate material costs. Secondly new machines are not necessarily more efficient in their utilisation of material. In textiles, the evidence on this question is mixed. w* depends on power costs as well.

Hal Hill[50] has analysed the question of choice of technique in Indonesian weaving industry. Hill uses modified neo-classical approach to choice of technique. The modifications are following.

1. A discrete production function is assumed. Naturally the isoquant is represented by a series of segments.
2. Because of differences in product quality and the price of non-labour inputs, output must be measured in terms of value added.
3. The slope of isocost line should not be given by w / r. This is inadequate because it is timeless. In order to compare capital costs incurred in the current project with a stream of annual wage payment paid over the life of a project, the annuity formula must be used.

Hill argues that for a variety of institutional and economic reasons, firms employing different techniques do not face the same wage to interest ratio. Factor market segmentation is one of the key factors explaining the continued existence of a wide range of techniques in industry. This factor market segmentation distorts factor prices, resulting into divergence between market prices and shadow prices.

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[50] Hal Hill: "Choice of Technique in the Indonesian Weaving Industry", Economic Development and Cultural Change, 1983.

Hill constructs isoquants for all the four prevailing techniques in Indonesian weaving sector. Two important conclusions emerge from this. First, the range in terms of investment costs and units of labour required to produce a given value added is very great. Second, it can be concluded that all four techniques are technically efficient because the isoquant is convex to the origin. But technically efficient techniques may not be economically efficient. This depends on factor prices. Hill introduces actual market prices faced by individual producers, and shows the relative economic efficiency of techniques. Hill also shows that this conclusion is likely to be changed when shadow prices are used. In this case an intermediate technology (semi-automatic loom) is more economically efficient than the technically efficient capital-intensive (automatic looms) technology. Handloom is shown to be efficient neither at market prices nor at shadow prices.

In India a major debate erupted in 1950s about the choice of technique. The All-India Khadi and Village Industries Board's Ambar Charkha Programme generated a lot of discussion. V.M.Dandekar[51] studied this Programme in detail and argued that ambar charkha is a beginning from scratch, as there does not exist any traditional small-scale industry for spinning. Dandekar opined that capital cost of the Programme would be small, only about half of the annual cost of the subsidy. This process of developing upwards from the village base may be compared with the alternative of proceeding downwards from the existing centralised modern industry as recommended by the Textile Enquiry Committee. A modern spinning unit can be set up in every important cotton-growing centre, at no greater cost.

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[51] V.M.Dandekar: "Rationale of the Ambar Charkha", Economic Weekly, July 6, 1957, pp. 863-67.

Joining this ongoing debate on ambar charkha Sen[52] attempted to apply the conventional criteria for technological choice to the problem. Picking out data from 'The Report of the Ambar Charkha Enquiry Committee (1956)' Sen fits it in to conventional criteria for technological choice to find out the following values from the available data-

(a) the productivity of labour

(b) the net value added per unit of output

(c) the net surplus per unit of output

(d) the capital-output ratio, and

(e) the rate of surplus per unit of capital investment.

Sen finds out that even with very low wages, ambar charkha, far from creating any surplus, produces huge deficit per worker per day. Even the recurring cost far exceeds the output flows from the charkha and its contribution to domestic capital accumulation seems to be very definitely negative. In order that ambar charkha might have no recurring adverse effect on the national capital stock, the workers would have to be happy with very low wages.

D.Shenoy[53] commented that Sen's definiteness of the conclusions is because of some implicit assumptions. Shenoy, assuming the existence of disguised unemployment, presents this problem in context of a real conflict between the maximisation of the income and employment and the maximisation of the rate of growth.

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[52] A.K.Sen: "A Short Note on the Ambar Charkha", Economic Weekly, October 9, 1957, pp. 1357-58. See also, Sen: "More on the Ambar Charkha", Economic Weekly, November 23, 1957, pp. 1509-10.
[53] D. Shenoy: "A Short Note on the Ambar Charkha, A comment", Economic Weekly, November 16, 1957, pp. 1483-84.

A.Rudra[54] pointed out that the relationship between outlay, employment and output has to be considered, not in the rigid terms of constant coefficients, but in somewhat, more flexible terms. These coefficients can provide some approximation in case of factory type, but they are grossly inadequate in case of agriculture and small industries. Rudra argued that this whole debate on choice of technique has little relevance for Indian small-scale industry, on which this debate has been centred. In a large part of ambar charkha or handloom sector there is little possibility of surplus being realised in the form of profit. This is so because of it's being predominantly 'self-employment' type.

But there is virtually no serious academic research on the subject of 'choice of technique' in general and in textile industry particularly in reference to India. Although there is some literature on the issue of relative costs of production in the different sectors of the textile industry, there has been little attempt at a comparative evaluation of the different techniques of production from a cost-benefit perspective. In fact, there are only two studies of note, one by Planning Commission and the other by World Bank.

The Planning Commission[55] study entailed the setting up of a linear programming model specifying an objective function for total cost minimisation, subject to constraints on output, an upper limit for capital investment and a lower limit for employment. The data collected for the study indicated that whereas fixed capital cost per unit of output were the highest in the mill sector and the lowest in the

[54] A.Rudra: "Investment Allocation and Technological Choice, Some Practical Considerations", Economic Weekly, Annual, 1959, pp. 189-92.

[55] Planning Commission: 'Choice of Technology in Textile Industry', Project Appraisal Division, Technology Analysis Unit (mimeo), 1979.

handloom sector, employment per unit of output was the highest in the handloom sector and the lowest in the mill sector. This exercise indicated that at actual factor cost, for coarse and lower medium varieties of cloth, handloom were the preferred mode of production. On the other hand, for higher medium cloth, the relative share of powerlooms and handlooms varied with the severity of the postulated capital constraints, the share of the powerlooms rising as the constraint was eased. Any production by the mills was sub-optimal. Even using a common shadow wage for all the techniques, handlooms were the preferred technique for coarse and lower medium cloth, whereas the mill sector got a share in the production of higher medium cloth only if the low capital constraint was relaxed. The study seemed to justify, *post-facto*, the policy bias in favour of the decentralised sectors.

Since the government in a predominantly market economy does not possess the power to peg sectoral output at the optimally indicated level, this exercise has limited utility. This study was based on grossly unrepresentative data. The most serious drawback was its assumption of uniform yarn prices[56]. This introduced a substantial downward bias in the cost estimates of the decentralised sector vis-à-vis the mill sector.

The choice of modes of production is not determined by the fiat of a planning authority but largely by the prices of the factors of production and the possibilities of substitution between them. This is typical neo-classical approach, which is adopted by

[56] In actual fact yarn costs to the decentralised sector were around 15% higher. See Report of the Expert Committee on Tax Measures to Promote Employment, Ministry of Finance, January 1980, Chapter VI, and pp.88.

Mazumdar[57] for evaluating alternative techniques. Mazumdar finds out the inputs required to produce value added of Rs 10000 in handloom, powerloom and mill sector. From this input values, the private and social profitability of alternative techniques is calculated by working out the 'switch-over' rate of interest. Mazumdar's results are summarised in table 10.

These results are used to explain the observed proliferation of powerlooms in recent years. This also shows that when social profitability is considered, powerlooms do not appear to be the preferred technique except in a very narrow range of discount rates. Mazumdar's analysis leads to conclusions very different from that of the Planning Commission study. Mazumdar's analysis concludes that the growth of powerloom sector constitutes a social loss and the prevailing policy bias against the mill sector has little economic rationale. An interesting outcome of Mazumdar's analysis is that it is not the policy discrimination against mills but the intrinsic comparative advantage of powerlooms, which is responsible for rapid proliferation of powerlooms.

Table 3.10: 'Switch-over' Interest Rates for Different Techniques

| | At Actual Wage Cost | At Shadow Wages* |
|---|---|---|
| Mills to Powerlooms | 13.2 | 30.1 |
| Powerlooms to Handlooms | 46.05 | 34.67** |

* Mill shadow wage equal to Powerloom wage (which has been taken to be around 43 percent of the mill wage). Handloom shadow wage is equal to powerloom wage

** For determining social profitability, 50 percent of the value of land and buildings has been added to the capital cost of the handloom weaving.

*Source*: Mazumdar (1984), part II, pp. 46-51, Table II.2.

A careful examination of sources of data of Mazumdar's analysis shows that a firm assertion of this kind is not possible. There is significant overestimation in assuming

[57] D.Mazumdar: 'The Issue of the Small versus Large in the Indian Textile Industry', World Bank Staff Working Paper No. 645, 1984.

value-added ratio as 1.91 for the cotton textile industry derived from the data given in the ASI for the year 1977-78. When this overestimation is removed, in terms of private profitability, the switchover interest rate from mill to powerloom rises to 18.2 per cent. Using a shadow wage rate for the mills equal to the powerloom wage rate, the switchover interest rate becomes as high as 41.6 per cent. From a social point of view powerlooms seem to be even more undesirable than indicated in the World Bank study.[58]

S.Misra calculates IRR separately for the production of grey cotton cloth and processed cotton cloth without taking in to account the incidence of excise duty and for processed cotton cloth inclusive of excise duty. The results are shown in the following table.

Table 3.11: IRR of Mill and Powerloom (%)

| | Mill | Powerloom |
|---|---|---|
| 1. Grey cloth | 23.3 | 21.1 |
| 2. Processed cloth (without excise duty) | 30.6 | 28.7 |
| 3. Processed cloth (with duty) | 5.3 | 28.7 |

*Source: ibid.*

These results again cast doubts on the validity of ascribing the phenomenal growth of powerloom sector to the relative profitability of grey cotton cloth production vis-à-vis the mill sector. Because of many reasons it would be misleading to compare alternative modes of production on the basis of wage costs alone. Sectoral

[58] Sanjiv Misra: India's Textile Sector, A Policy Analysis, Sage Publications, 1993.

cost calculation does not take in to account the price premium charged by the mills because of better quality. The doubt expressed above about the superiority of powerloom in production of grey cotton cloth is not conclusive. Grey cloth constitutes only a small fraction of the total cloth output. Misra argues that to pass the judgement, it is necessary to take in to account the processing activity as well. Processing further widens the cost differential between handloom and powerloom. Its magnitude and impact on relative competitiveness of handloom and powerloom depends on many other factors. Moreover, the relative competitive strength depends on fiscal considerations as well. Differential incidence of excise duty and tax evasion by the powerlooms has contributed in tilting the balance in favour of powerlooms vis-à-vis the mills. This unequal incidence of excise duty is the reason why both powerloom and handloom produce a much greater proportion of their cotton cloth output as fine cloth[59]. At the same time handlooms face a large cost handicap *vis-à-vis* the powerlooms on account of their substantially lower productivity. This suggests gradual decimation of handlooms. But the fact of the day is that handlooms have managed to survive! A differentiation of products and, to a lesser degree, of markets *vis-à-vis* powerloom production has enabled this sector to survive.

[59] Excise duties at the fabric stage maintain a progression on an *ad valorem* basis. Till the 1989-90 budget, cotton fabric with average yarn count of 51s and above was taxed at the maximum rate applicable, irrespective of value. The rationale behind this was to help the hand processors who process cotton dhoties and sarees of this specification.

*CHAPTER: FOUR*

# INDIAN TEXTILE INDUSTRY

## 4.1 Introduction

The textile industry is one of the most important industry not only in the India but all over the world. When Lewis talks about the leading sector he underlines the importance of textile industry. The core of the industrial revolution of the Europe was made of this sector, especially of the Great Britain. The textile industry of Manchester and Lancashire contributed a great deal in financing of industrialisation of the Britain. Even the colonial policy of British rule depended heavily on this sector. More or less this sector was the leading sector in early phase of industrialisation in all developed countries

The cotton mill industry is amongst the oldest and largest manufacturing industries in India. It is more than hundred years old and occupies a dominant position in the industrial structure of India. About a million workers are employed who contribute about 14 percent to value added of the organised manufacturing. It has the single largest weight in the index of industrial production and is one of the largest export industries. Next only to food, clothing is the most important item of family expenditure in India accounting for about 10 percent. Thus, both from the points of view of production and consumption the textile industry is very important.

The importance of textile industry lies in two reasons. One, in most of developed countries of today, textile industry was the leading sector in the process of industrialisation. Second, the vigorous growth of textile industries has contributed in a major way to the spectacular performance of newly industrialised countries of Southeast Asia.

Despite the fact that the textile was the first major industry to be established in India, it has been among the slowest growing industries. During the period 1956-57 to 1981-82, net value added in textiles grew at 3 per cent per annum against the average of 5.5 per cent per annum for all industry.[1] Far from the dynamism exhibited by other developing countries, Indian textile industry is plagued by a host of problems. From a peak share of 58 per cent of all developing country export of textiles in 1953, India's share fell to a meagre 8 per cent by 1969[2]. Currently it is around 4 per cent. Indian textile industry failed to be the engine of growth.

There are many contending explanations of this state of Indian textile industry. But there is little doubt that policy framework has been crucial. Apart from the serious implication of an 'export pessimistic' development paradigm, the textile sector in India has been subject to a degree of state regulation and control which has few parallels in the non-socialist world.

There are at least five manifest features of Indian textile sector, mostly consequence of state interventions.[3]

1. The co-existence of a very broad spectrum of production techniques.

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[1] I.J.Ahluwalia: Industrial Growth In India, Stagnation Since The Mid-Sixties, Chapter 2, Table 2.3, OUP, 1985.

[2] Martin Wolf: India's Export, Oxford University Press, 1982, p. 33.

[3] Sanjiv Misra: India's Textile Sector, A policy Analysis, Sage, 1993, p. 25.

2. The distinct trend towards decentralised, small-scale manufacturing in the unorganised or informal sector.
3. The sustained predominance of cotton as the primary raw material.
4. The existence of a large public sector.
5. A very high degree of domestic orientation of the industry.

It is a matter of debate that how far the official policy can be held responsible for the ills that beset the Indian textile industry. We shall examine this later on.

## 4.2 Structure of Indian Textile Industry

India has the largest installed weaving capacity in the world, having 58% of global share of looms, consisting of 1.8 million power-operated looms and 3.5 million hand-operated looms.[4] Of this only around 0.2 million looms are accounted for by the organised mill sector. The installed loomage has remained constant since 1950. Till recently, this was on account of a deliberate policy, which prohibited the expansion of loomage in the organised mill sector. Even after removal of this freeze by 1985 textile policy there has not been any significant capacity expansion in the organised sector. On the contrary the installed capacity has declined marginally. The weaving segment of textile sector presents a picture of declining capacity utilisation and increasing number of idle looms as evident from table 4.1. In the organised weaving sector the production of cloth per active loom seems to have remained virtually stagnant till 1986-87 and thereafter has shown a marked decline. This stagnancy in the output of cloth per working loom in linear meters could mask to some extent the increasing

[4] Govt. of India: Textile Policy, 2000.

width and closeness of weave (reed and pick count) of mill made cloth. Mills responded to competition from the powerloom by weaving stronger and more durable cloth[5].

Table 4.1: Weaving Capacity, Rates of Utilisation and Production of Cloth in the Organised Sector 1978-79 to 1998-99

| Year | Installed capacity (000) | Rate of utilisation (%) | Active loom (000) | Idle loom (000) | Idle loom in closed mills (000) | Production of cloth (million meters) | Production per active loom (000 meters) |
|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| 1978-79 | 207 | 79 | 164 | 43 | NA | 4328 | 26.39 |
| 1979-80 | 208 | 78 | 162 | 46 | NA | 4085 | 25.22 |
| 1980-81 | 208 | 77 | 160 | 48 | 8.5 | 4168 | 26.05 |
| 1981-82 | 210 | 74 | 155 | 55 | 59.5 | 3808 | 24.57 |
| 1982-83 | 210 | 59 | 124 | 86 | 8.1 | 3132 | 25.26 |
| 1983-84 | 210 | 57 | 120 | 90 | 21 | 3487 | 29.06 |
| 1984-85 | 210 | 63 | 132 | 78 | 25.6 | 3432 | 26.00 |
| 1985-86 | 210 | 62 | 130 | 80 | 22.1 | 3376 | 25.97 |
| 1986-87 | 208 | 61 | 127 | 81 | 32 | 3317 | 26.12 |
| 1987-88 | 199 | 65 | 129 | 70 | 47.1 | 3027 | 23.47 |
| 1988-89 | 184 | 65 | 120 | 64 | 58.6 | 2808 | 23.40 |
| 1993-94 | 150 | 54 | NA | NA | NA | 1990 | NA |
| 1994-95 | 139 | 51 | NA | NA | NA | 2271 | NA |
| 1995-96 | 132 | 53 | NA | NA | NA | 2090 | NA |
| 1996-97 | 124 | 52 | NA | NA | NA | 1957 | NA |
| 1997-98 | 124 | 52 | NA | NA | NA | 1948 | NA |
| 1998-99 | 123 | 51 | NA | NA | NA | 1785 | NA |

Source: Annual Reports of the Ministry of Textiles, 1985-2000.

As a consequence, the output in meters, per kilogram of yarn consumed, declined throughout the sixties and early seventies. Further it is generally observed that mills weave wider cloth than powerlooms.[6]

[5] A.V.Desai: "Technology and Market Structure under Government Regulation- A Case Study of Indian Textile Industry", Economic and Political Weekly, 29 January 1983.
[6] According to the estimate of the South India Textile Research Association (SITRA), mill-made cloth is around 10-12 per cent wider than cloth woven on powerlooms. See SITRA (1985), p. iii.

Table 4.2: Growth of Capacity in the Powerloom Sector (As on 31st December)

| Year | Authorised Powerlooms (000) |
|---|---|
| 1977 | 348 |
| 1980 | 452 |
| 1981 | 499 |
| 1982 | 573 |
| 1983 | 605 |
| 1985 | 639 |
| 1988 | 873 |
| 1989 | 944 |
| 1990 | 1044 |
| 1991 | 1135 |
| 1992 | 1200 |
| 1993 | 1239 |
| 1994 | 1314 |
| 1995 | 1365 |
| 1996 | 1412 |
| 1997 | 1523 |
| 1998 | 1595 |
| 1999 | 1617 |

**Source**: Annual Reports of the Ministry of Textiles, 1985-2000.

In decentralised sector there has been phenomenal growth of powerlooms as evident from table 4.2. Till 1985 there was virtual ban on setting up of new powerlooms. 1985 textile policy removed this ban. Naturally the figures up to 1985 includes only authorised looms only. It is estimated that as on 1st January 1985, there were at least 0.2 million unauthorised powerlooms. The figure 944000 in 1989 indicates the number officially registered up to October 1989.

However, the number of applications received would be a better indicator of the true number of powerlooms. The total number of powerlooms covered by applications till October 1989 was 1.073 million. It would, therefore, be reasonable to assume the number of installed looms in the country around 1.1 million.

While the number of powerlooms in the decentralised sector is more than five times the number in organised sector, the output of the former is only two and half times that of the latter. This means that there is substantial under-utilisation of capacity in decentralised sector.

Table 4.3: Sectoral Production of Woven Cloth, 1978-79 to 1988-89

(In million meters)

| Year | Mill sector | Decentralised sector | | Total |
|---|---|---|---|---|
| | | Handloom | Powerloom | |
| 1978-79 | 4328 | 2432 | 3948 | 10708 |
| 1979-80 | 4085 | 2462 | 3835 | 10382 |
| 1980-81 | 4168 | 2680 | 4140 | 10988 |
| 1981-82 | 3808 | 2626 | 4547 | 10981 |
| 1982-83 | 3132 | 2788 | 4694 | 10614 |
| 1983-84 | 3487 | 2956 | 5315 | 11758 |
| 1984-85 | 3432 | 3137 | 5445 | 12014 |
| 1985-86 | 3376 | 3236 | 5886 | 12498 |
| 1986-87 | 3317 | 3449 | 6222 | 12988 |
| 1987-88 | 3027 | 3508 | 6457 | 12992 |
| 1988-89 | 2808 | 3466 | 7008 | 13282 |
| 1989-90 | 2667 | 3924 | 11632 | 18223 |
| 1990-91 | 2589 | 4295 | 13348 | 20232 |
| 1991-92 | 2376 | 4123 | 13262 | 19761 |
| 1992-93 | 2000 | 5219 | 14644 | 21863 |
| 1993-94 | 1990 | 5851 | 15994 | 23835 |
| 1994-95 | 2271 | 6180 | 15976 | 24427 |
| 1995-96 | 2019 | 7202 | 17201 | 26422 |
| 1996-97 | 1957 | 7456 | 19352 | 28765 |
| 1997-98 | 1948 | 7603 | 20951 | 30502 |
| 1998-99 | 1785 | 6792 | 20689 | 29266 |
| 1999-2000 | 1714 | 7352 | 23187 | 32253 |

Source: Annual Report of the Ministry of Textiles, 1978-2001.

The official statistics on the production of cloth in the three sectors for the period 1978-79 to 1988-1989 is given in table 4.3.

During this period mill output declined in absolute as well as relative terms, resulting into negative trend rate of growth. Powerloom output grew faster than the growth in handloom. Consequently the share of the mill sector in total cloth

production declined from over 40 per cent in 1978-79 to around 21 per cent in 1988-89, with the share of decentralised sector increasing correspondingly. Powerlooms contributed almost half of production. Surprisingly the share of handloom increased slightly during this period.

One of limitations of official estimates of production is lack of reliable data on decentralised sector. The production of decentralised sector is calculated by using appropriate conversion factor. Working Group on Textile Industry for the Eighth Five-Year Plan [1989] had revised this conversion factor. But still the erroneous practice of using a common conversion factor for both handloom and powerloom has been continued.

Table 4.4: Sectoral Contribution to Production of Different Categories of Cloth and Composition of Output, 1985-86 and 1988-89 (%)

| | Mill | | Powerloom | | Handloom | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 1985-86 | 1988-89 | 1985-86 | 1988-89 | 1985-86 | 1988-89 | 1985-86 | 1988-89 |
| Cotton Cloth | 29.4<br>(76.6) | 23.3<br>(72.0) | 41.9<br>(55.1) | 45.6<br>(49.3) | 28.7<br>(96.0) | 31.1<br>(96.1) | 100 | 100 |
| Blended Cloth | 50.5<br>(23.2) | 47.8<br>(27.8) | 45.5<br>(10.5) | 48.0<br>(9.8) | 4.0<br>(2.4) | 4.2<br>(2.4) | 100 | 100 |
| 100% Non-Cotton | 0.2<br>(0.2) | 0.1<br>(0.2) | 98.0<br>(34.4) | 98.6<br>(40.9) | 1.8<br>(1.6) | 1.3<br>(1.5) | 100 | 100 |
| | (100) | (100) | (100) | (100) | (100) | (100) | | |

Note: Figure in parentheses indicates the sectoral composition of output
Source: Sanjiv Misra (1993), table 4.10, p. 85.

The three sectors of textile industry have specialised in production of different categories of cloth. Table 4.4 indicates the percentage contribution of each sector in the production of different categories of woven cloth and the sectoral composition of output for the year 1985-86 and 1988-89. Data based on accurate conversion factor for earlier period is not available. In this period the share of mill sector in the

production of cotton cloth has declined and decentralised sector, particularly powerloom, has increased its share. Mill sector has fared better in the production of blended cloth. While cotton cloth is produced by all the three sectors, mainly the mill sector and the powerloom sector produce blended cloth. The production of pure non-cotton cloth is exclusively a domain of powerloom.

Table 4.5: Production of Fabrics in Different Sectors (Million Sq. Mts.)

| | 1991-92 | 1992-93 | 1993-94 | 1994-95 | 1995-96 | 1996-97 | 1997-98 | 1998-99 | 1999-2000 |
|---|---|---|---|---|---|---|---|---|---|
| **Mill Sector** | | | | | | | | | |
| Cotton | 1651 | 1407 | 1356 | 1262 | 1159 | 1222 | 1238 | 1111 | 1105 |
| Blended | 666 | 532 | 575 | 746 | 602 | 488 | 466 | 444 | 379 |
| 100% non-cotton | 59 | 61 | 59 | 263 | 258 | 247 | 244 | 230 | 230 |
| Total | 2376 | 2000 | 1990 | 2271 | 2019 | 1957 | 1948 | 1785 | 1714 |
| **Handloom Sector** | | | | | | | | | |
| Cotton | 4065 | 4686 | 5241 | 5429 | 6239 | 6441 | 6699 | 5861 | 6376 |
| Blended | 12 | 8 | 2 | 13 | 18 | 52 | 69 | 111 | 119 |
| 100% non-cotton | 46 | 525 | 608 | 738 | 945 | 963 | 835 | 820 | 857 |
| Total | 4123 | 5219 | 5851 | 6180 | 7202 | 7456 | 7603 | 6792 | 7352 |
| **Powerloom Sector** | | | | | | | | | |
| Cotton | 6383 | 7306 | 7836 | 7021 | 7014 | 7238 | 6652 | 5855 | 6291 |
| Blended | 1885 | 1996 | 2425 | 2640 | 3137 | 3948 | 4481 | 4256 | 4613 |
| 100% non-cotton | 4994 | 5342 | 5733 | 6315 | 7050 | 8166 | 9818 | 10478 | 12283 |
| Total | 13262 | 14644 | 15994 | 15976 | 17201 | 19352 | 20951 | 20689 | 23187 |

Source: Textile Commissioner, 2001

The sectoral composition of output indicates almost unchanged (around 96%) share of cotton cloth in handloom output. About 90 per cent of powerloom output comprised cotton and pure non-cotton cloth. Pure non-cotton shows a rising trend in powerloom output. In organised sector production the major contributor was cotton, but its share shows a declining trend in favour of blended cloth.

The table 4.5 reaffirms the conclusions drawn above. The share of mills in cotton and blended cloth is going down and going up in non-cotton segment. Handloom is growing in all three segments. Of late there seems to be deceleration in share of powerloom in cotton but there has been phenomenal growth in blended and non-cotton segment.

Cotton cloth in itself is not a homogeneous category. Dissection of cotton cloth production by count group is interesting and reveals the revealed comparative advantage in the three sectors. The data for 1983 is presented in table 4.6.

Table 4.6: Sectoral Consumption of Cotton Yarn according to Count Group, 1983
(In million Kg)

| Count Group | Mill | Powerloom | Handloom |
|---|---|---|---|
| 1-10 | 20 (5.2) | 36 (11.7) | 59 (20.6) |
| 11-20 | 116 (30.1) | 54 (17.5) | 97 (33.9) |
| 21-30 | 144 (37.3) | 57 (18.5) | 38 (13.3) |
| 31-40 | 87 (22.5) | 85 (27.6) | 49 (17.1) |
| 41-60 | 10 (2.6) | 38 (12.3) | 28 (9.8) |
| 61-80 | 3 (0.8) | 27 (8.8) | 12 (4.2) |
| Above 80 | 6 (1.5) | 11 (3.6) | 3 (1.1) |
| Total | 386 (100) | 308 (100) | 286 (100) |

Source: Textile Commissioner.

Following inferences can be drawn from this data

1. A substantial proportion (54.5 per cent) of the output of the handloom sector was in the category of very coarse (1-10 count) and coarser than medium (11-20

count) cotton cloth. This proportion was much higher than in the case of mills (35.3 per cent) or powerlooms (29.2 per cent).

2. Nearly 60 per cent of mill output was in the medium B (21-30) and medium A (31-40) category of cotton cloth. The corresponding proportion of this category of cloth for the powerlooms and handlooms was lower at around 46 per cent respectively.
3. A much greater proportion of the handloom and powerloom output consists of fine (41-60) and superfine (61 and above) cloth as compared to the mills. Nearly 25 per cent of the powerloom output and 15 per cent of handloom output was of such cloth as compared to only 5 per cent for the mills.

The above pattern of production has not changed significantly over the years. As pointed out by Mazumdar, even in 1970 over 58 per cent of the handloom cloth output was of the coarse and coarser than medium variety. Similarly 59 per cent of the mill output constituted medium variety of cloth, and almost 30 per cent of powerloom output and 12.5 per cent of handloom output constituted fine cloth (*vis-a vis* only 6.5 percent for the mills).[7]

Broadly, it could be stated that some degree of inter-sectoral specialisation in the production of cotton cloth seems to be in evidence. Handlooms concentrating on coarse cloth, the mills on medium and finer than medium varieties and the powerlooms on finer than medium, fine and superfine varieties of cotton clothe. In the case of production of cloth other than cotton, the composite mills have specialised in blended cloth while the powerlooms on pure non-cotton cloth.

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[7] D.Mazumdar: 'The Issue of the Small versus Large in the Indian Textile Industry', World Bank Staff Working Paper No. 645, 1984, Table 1.4, p.26.

## 4.3 Survival of the Handloom

The handloom sector is the largest unorganised economic activity and provides maximum employment in rural areas, after agriculture. According to the Census of Handlooms, there were 43.7 lakh handloom weavers in 1987-88, of which 22.4 lakh were full-time weavers and the rest part-time. In addition there were 21.6 lakh persons engaged in preparatory work, nearly 10.9 lakh of them on a full time basis.[8] That is why handloom has been given high priority in planning in India. Because of multiple reasons, handlooms are moving towards extinction. Other than coarse and medium categories of cloth, this sector specialises in the production of some exquisite cloth showing excellent craftsmanship. The weavers producing fine cloth have not faced difficulties, due to special characteristics of their products. On the other hand, those making coarse cloth have been threatened with employment because of lower productivity.

There are three demarcated sectors in handloom: (1) independent weavers, (2) master weavers, and (3) the co-operatives sector. Theoretically, the independent weaver undertakes production on his own, with help of household members, and can manage with his own resources and borrowed money. In fact, however, many weavers are dependent on master weaver and merchants, as they lack capital for credit, raw materials and marketing of products, and become dependent on master weavers.

The master weaver employs outside labour for weaving and advances raw materials or cash or both to weavers on the condition that they should supply him certain pieces of cloth with specified dimensions, quality and pattern within a

[8] Govt. of India: Census of Handlooms in India, 1987-88.

stipulated period of time. While some master weavers are still weaving for themselves, some have given up weaving and concentrate on trading in yarn and cloth. A merchant (trader) also sets up as an employer, combining yarn selling and cloth stocking. Moreover, there are a certain number of moneylenders who are taking to similar relation with weavers. The master weaver sector is criticised for its exploitative nature. But given the institutional structure of handloom sector, it has fulfilled an important vacuum. Therefore, a study team on the problem of handloom industry suggested that until the co-operative sector was sufficiently developed and was able to give full service to its members and came up at least to the level which the master weaver has reached, it would be against the interest of the weavers to interfere with the master weaver sector.[9]

It was generally accepted that a co-operative getting together of the weavers themselves is the best answer to end the exploitation. While the number of weavers in co-operative is steadily increasing, the share of co-operative in handloom production has remained low.

The handloom industry is facing several problems like- unequal competition with the mill and powerloom sectors, lower productivity, inferior quality, and difficulty in marketing. But irregular and inadequate supply and wide fluctuation of prices of yarn are the most important problem. In 1986 estimated availability of yarn to the handloom sector was only 2857 lakh kg as against the estimated requirement of 4078 lakh kg.[10] Despite of the mandatory restriction of production of 50 per cent of yarn in

[9] Govt. of India: Report of the High Powered Study Team on the Problems of Handloom Industry, 1974, pp. 6-10.

[10] K.R.M. Rao: Development of Handloom Industry, Delhi, Discovery, 1990, pp. 66-68.

hank. form on co-operative spinning mills, the actual delivery of hank yarn to handloom amounts to about 40 per cent of total yarn produced. This is ascribed to two different factors. First, there is diversion of duty free hank yarn to powerloom. Second, the demand for yarn by handloom is for specific qualities and counts and there is often a mismatch between the kind of yarn required and that, which is supplied.[11] The existence of intermediaries jacks up yarn prices. Since handloom weavers do not have the bargaining power to negotiate with master weavers and merchants (traders), they have to buy yarn at high prices and can not translate this into prices of their products.

As a result of the above factors, many handloom units are suffering from under-utilisation of capacity. According to the sample survey of the Labour Bureau in 1987, the total number of looms installed in the sheds and in the premises of the workers was found to be 5687 and 50339 respectively. However, only 4302 looms in the sheds and 36514 in the premises of the workers were found to be working when these units were visited.[12]

The adopted strategy of specific scheme-wise support through co-operative and corporate agencies in the states has not been particularly effective. A study by the Institute of Rural Management (IRMA) in 1989 found that state aid made little difference to the earnings and the socio-economic status of handloom weavers. State intervention appeared to have helped a significant segment of high earning weavers to earn even more and a very restricted number of weavers in the low earning category

[11] Govt. of India: Report of the Committee to Review the Progress of Implementation of Textile Policy of June 1985, p.11.
[12] Govt. of India: Report on the Working and Living Conditions of Workers in the Handloom Industry in India (1986-87), 1990, p. 9.

to move up to the middle earning category.[13] In other words, state aid did not help the substantially poor weavers to get out of the trap of poverty.[14] The drudgery and low return for the time spent makes the handloom industry lose its attraction for the present generation of artisans and also the younger generation.[15] Since there is a large information gap concerning handloom sector and the study by IRMA is rare of its kind its conclusions are worth quoting. This not only reveals wide regional variations in terms of the technology used, the type of products and the skill levels of the weavers, but also large differences in weavers earnings. The findings of the study are briefly summarised below.

1. About 70 per cent of the handloom output are sold in rural areas of which the major proportion is produced outside the co-operative sector and, therefore, lies largely outside the pale of government interventions.
2. At one end, around 12 per cent of the weaver households earn on an average around Rs. 1100 per month from weaving alone, while on the other, 36 per cent have an average monthly income of only Rs. 250, of which a meagre Rs. 150 is from weaving.
3. The highest earners were associated with the most primitive technology. Thus skill and product mix are far more important determinants of weaver's earnings than technology.

[13] The study for IRMA defined high earners, medium earners and low earners as the following. High earners are getting monthly household income above Rs 750. Medium earners are getting monthly household income between Rs 300 and Rs 750. Low earners are getting monthly household income up to Rs 300.

[14] Govt. of India: 1989, pp.31-32.

[15] Govt. of India, 1981, p. 18.

4. State interventions benefit only around 29 per cent of the weaver while the remaining survive with little or no state support.
5. State intervention seems to have primarily helped the very high earning weavers to earn even more and to a lesser extent the low earning weavers to move up to middle range. The benefits of such interventions have largely bypassed the lowest rung of such weavers.

## 4.4 Rapid Growth of the Powerloom Sector

Powerloom is an intermediate technology situated between the two extremes of handloom and mill sector. Powerloom came into existence in 1930s and 1940s, when some handloom weavers started buying discarded looms from mills. It was an attempt by handloom weavers to break technology frontier to improve efficiency and productivity and reduce the strain of operation.

The powerloom sector consists of mainly two types: the owner proprietor type (weaver working on his own) and the master weaver type. In the first the weaver purchases yarn, manufactures fabric and sells them. He independently raises the finance to carry out this activity. In the master weaver type, a weaver carries out the manufacturing task but receives only the conversion cost. The master weaver supplies the yarn to the weaver, gets it woven by him and sells fabric in the market. Composite mills, process houses, export agencies or fabric merchants may be termed as master weaver. This relationships gives the benefit of not only paying low wages but also the facility of obtaining yarn cheaply in bulk, adjusting the pattern of production and the better marketing.[16]

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[16] Bombay Textile Research Association: Powerloom Weaving in Maharastra, An In-depth Study, pp.4-5.

The most serious problem faced by powerloom is lack of capital, either bank or co-operative credit. More than 95 per cent of the working capital and most of the fixed capital is from non-bank source. This is typically cash and is nothing other than an extended circulation of undeclared income. Quite a bit of the capital comes from the discounting done in the cloth trade, which is fed back into the sphere of production. Further the short-term interest rates are 3 to 5 percentage points above commercial bank rates, sometimes more. As a result, most owners must depend on master weaver and are under their control. In the powerloom sector, weavers can escape the drudgery of handloom weaving, but they are not free from the control of master weaver and intermediary.

## 4.5 Sickness in Mill Sector

With the expressed objective of ensuring adequate supply of yarn to decentralised sector there has been substantial growth of spinning capacity. But the growth of loomage has been insignificant on account of freeze imposed by the government up to 1985. Conversely, loomage has declined since 1985-86. The share of mill production in total cloth production has gone down and market share of mill sector has been eaten up by powerloom. This dwindling market share has made marginal firms or mills sick.

The Expert Committee on the Textile Industry pointed out as causes of sickness, managerial factors such as managerial incompetence, technical incompetence, de-motivated personnel, excess labour, incorrect product-mix, poor marketing, obsolete machinery, inadequate maintenance and poor labour relations.[17]

[17] Govt. of India: 1985, p.67.

However, the causes may be less managerial than structural. While a few mills are prosperous and introducing the latest machinery, many are sick and equipped with obsolete machinery. Table 4.7 shows that profit after tax as percentage of net worth in cotton mills have often been negative or negligible since mid 1970s.

Table 4.7: Profitability Ratios of Cotton Textile Industry (%)

| Year | Gross profit as percentage of sales, net of rebate, discount, excise duty and cess | | Profit after tax as percentage of net worth | |
|---|---|---|---|---|
| | Cotton textile industry | All industry | Cotton textile industry | All industry |
| 1980-81 | 7.8 | 9.6 | 16.9 | 14.9 |
| 1981-82 | 5.2 | 9.3 | Negative | 13.4 |
| 1982-83 | 6.7 | 8.9 | 4.9 | 12.1 |
| 1983-84 | 5.4 | 7.9 | 2.3 | 6.8 |
| 1984-85 | 5.1 | 8.5 | Negligible | 7.9 |
| 1985-86 | 6.9 | 9.0 | 3.7 | 8.3 |
| 1986-87 | 7.1 | 8.4 | Negligible | 5.4 |
| 1987-88 | 6.0 | 8.0 | Negative | 4.3 |
| 1988-89 | 6.6 | 8.9 | 0.7 | 7.1 |
| 1989-90 | 9.1 | 10.2 | 5.0 | 10.7 |
| 1990-91 | 11.9 | 11.2 | 14.3 | 12.5 |
| 1991-92 | 8.5 | 11.9 | 7.5 | 11.9 |

Note: Gross profit here are prior to interest but after depreciation
Source: ICMF, *Handbook of Statistics on Cotton Textile Industry*, 25th edition, 1995, p. 99.

Lower profitability is both a result of decline of the industry as well as a reason for lower investment in it. In the 1960s and 1970s, new industries came up under the import substitution promotion policy, which were more profitable. Thus investible funds flowed from the cotton mill industry to other industries. At the end of October 1995 the number of closed mills stood at 159 (cotton and man-made fibre mills) and was affecting 21300 employees. Closure of mills has contributed to development of powerloom sector. Closed mills sold looms and some erstwhile mill

workers with the necessary technical know-how joined the powerloom sector. The rise of powerloom sector has threatened the existence of weak mills.

Another reason for fall in the production of the mill sector is under-utilisation of capacity. D.U.Shastry pointed out shortage of raw material as the most important factor explaining under-utilisation in the spinning and weaving sector between 1950 and 1973.[18] But Shuji Uchikawa[19] considers reasons other than availability of raw. material important in explaining this under-utilisation of capacity. There is under-utilisation of capacity not only in mills but also in powerlooms.[20]

Apart from under-utilisation of capacity, poor maintenance is also important in explaining sickness in mill sector. Poor maintenance leads to low speed of machines, increased breakage of yarns in spinning as well as on the looms, frequent stoppage of machines and poor quality of the product. Consciousness among workers is indispensable to improve maintenance. Lack of standardisation of product is connected with low productivity. Besides, as change of variety means change of customer, a good long -term relationship between producer and customer is not established. As a result, there are many different varieties in same kind of cloth. For example, cotton shirting had 687 varieties and long cloth had 363 in 1980. Finally, inefficient inventory control pushes up production costs and deteriorates productivity. Ability to buy the right type of cotton at the right time is a major factor in overall efficiency. Using too good cotton for a given quality would tend to increase costs without adequate return. Conversely, poor quality cotton would reduce productivity as

[18] D.U.Shastry: The Cotton Mill Industry in India, Oxford University Press, 1984, pp.45-48.
[19] Shuji Uchikawa: Indian Textile Industry; State Policy, Liberalisation and Growth, Manohar, 1998, pp. 109-110.

[20] S. Misra: India's Textile Sector: A Policy Analysis, Delhi, Sage, 1993, p.123.

well as quality of cloth. In addition to correcting above points, a number of mills can improve productivity by installing balancing equipment and renovation of exiting machinery before going in for replacement. Mills to introduce new techniques must choose one of two ways. Either to pay surplus the labour high retrenchment benefits and introduce voluntary retirement or to extend capacity to the extent necessary to absorb the labour rendered surplus. Payment of compensation pushes up the cost of investment. Because of over capacity and freezing of loomage until 1985, room for drastic expansion of capacity had been restricted. Hence, in the long run, firms would be forced to adjust for the displacement of labour resulting from the introduction of new techniques, partly against the attrition of the labour force and partly by going in for an expansion of capacity.[21]

After 1985 the limit on loomage was abolished and the ceiling for exports of cotton yarn of counts of 41s and above was removed. The ceiling for exports of cotton yarn in count group 1-40s has been raised. Moreover, after the 1982 textile strike in Bombay, casual labourers have replaced permanent labourers. This helps the management in meeting the fluctuations in demand for the product and makes the labour market highly flexible both in terms of wage flexibility and numerical flexibility along with checking absenteeism.[22] Given the low wage rate in India, savings from the reduction of workforce per unit of output are hardly enough to

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[21] C.P.Chandrasekhar: Growth and Technical Change in Indian Cotton-Mill Industry; 1947-77, Ph.D. Thesis, JNU, 1981, p.210.

[22] R.C.Datta: "Management, Production System and Labour: Case Study of a Textile Mill", Economic and Political Weekly, 24Feb.1996, p. L3.

defray the increased capital cost of induction of advanced machinery. Since profitability in cotton textile industry is low, business groups have preferred to invest in other industries. Low profitability reduces the amount of investment for modernisation.

In a study done by the Policy Group for the Planning Commission, Goswami *et al.* [1989] worked out the costs of a financial package for the labour displaced as a consequence of scrapping 29000 looms and 1.67 million spindles in the NTC mills regarded as totally non-viable. According to this calculation, of the 81000 workers affected, only around 71000 would need the compensation package. The costs of the package that ensures 75 per cent of their usual wages for a period of five years works out to around Rs. 470 crores. Considering that the annual losses of the NTC mills alone have been in the vicinity of around Rs. 300-350 crores, if the implicit subsidies are also taken into account, the actual annual burden on the state exchequer of running these mills would not be very much lower than the cost of the rehabilitation package mentioned above. Even if the affected labour were paid their full wages without work for a period of five years, it would still amount to around two to three years of actual losses incurred by the NTC.

## 4.6 Competition between Three Sectors

One of the distinguishing features of Indian textile industry is coexistence of handloom, powerloom and mill sector. It is true that the share of these techniques in total cloth production is changing. But still the fact of the day is that these techniques are competing with each other in market.

### 4.6.1 Mill vs. Powerloom

The powerloom has outdone the mill sector in low and medium value cloth. Even after the distinction of excise duty between the mill and powerloom sector was removed, the latter has increased its production and share in total production. The powerloom is taking advantage of low wage labour out of the purview of factory act. On the other hand mill sector enjoys the advantage of productivity and availability of cheap yarn. However, the savings from the reduction in workforce per unit of output are hardly enough to defray the increased capital cost of induction of advanced machinery.

According to a survey by the Ahmedabad Textile Industry's Research Association (ATIRA) in 1985 wage rates prevailing in the powerloom sector were varying between Rs. 10 per operative per shift for preparatory and Rs. 25 per operative per shift for weavers. This was Rs. 50 per operative per shift in the mill sector. However, since this gap was offset by higher productivity of mills to some extent, the wage cost per metre was lower in powerloom by about 50 to 70 per cent.[23] At the same time yarn availability for powerloom was costing anywhere 7 to 10 per cent higher than yarn availability for composite mills. The joint study of three cotton textile research associations (CTRA) revealed that despite wage cost being lower by more than half in the powerloom sector, the cost of production of grey cotton fabric were on an average, only 5 per cent lower than in the mills. Assuming some price premium on mill made grey cloth on account of better quality and greater durability,

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[23] ATIRA: Rehabilitation of the Textile Industry, Ahmedabad, 1985, p. 105.

the marginally lower cost of production in the powerloom sector may not be adequate to tilt the competitive balance in their favour.

The CTRA study also revealed that as far as blended cloth was concerned, the sectoral costs of production in the mills were on an average, actually lower, by around 5 per cent. This was mainly on account of the high cost of blended yarn (three and a half time costlier than cotton yarn). The higher costs of blended yarn to the powerlooms more than offset the lower conversion costs vis-à-vis the mills. This explains why the mill sector, despite its declining cloth output, has generally been able to maintain its share in the production of blended cloth.

Thus, the available evidence does not conclusively establish the superiority of powerloom production of grey cotton cloth. It would, however, be misleading to judge the relative strength of mill and powerloom production on this basis since only a small fraction (less than 5 percent) of the total cloth output is sold as grey cloth. The rest undergoes processing and it would obviously be necessary to take into account the impact of this activity on the relative competitive strengths of the two sectors.

Analogous to the manufacturing sector in India, processing can be broadly divided into three distinct segments, namely, the processing houses in the mills, the independent processing houses which use power and the hand processors. As is the case in manufacturing, both wages and productivity are the highest in mill processing houses and the lowest in the hand-processing sector. According to the CTRA study mentioned earlier, the cost of fabric processing is lower by 20 percent in the independent power processing houses and by 40 percent in the hand processing houses vis- a- vis the mills. The cost of cloth after processing was worked out (Table 4.8) as following.

Table 4.8: Comparative Cost of Processed Cloth (In Relation To the Mill Sector)

| Item | Mills | Powerlooms* | Handlooms* |
|---|---|---|---|
| Drill | 100 | 95 | 96 |
| Sheeting | 100 | 93 | 96 |
| Long cloth | 100 | 93 | 98 |
| Shirting | 100 | 94 | 110 |
| Dhoti | 100 | 91 | 123 |
| Mull | 100 | 89 | 103 |
| Cambric | 100 | 95 | 120 |
| Poplin | 100 | 93 | 105 |
| Suiting | 100 | 94 | 95 |

Note: Handloom cloth and powerloom cloths are processed at independent process Houses

*Source*: ATIRA, Rehabilitation of the Textile Industry, 1985, p. 109

Consequently, subsequent to processing, the cost differential between mills and powerlooms, in respect of cotton fabrics, is further widened- processed cotton fabrics being on an average costlier to produce by 7 percent in the mills. In the case of blended fabrics, the cost advantage of the mills at the grey stage is neutralised at the processing stage, so that the cost of processed blended fabrics is virtually identical in two sectors.

Is the increase in cost differential for processed cotton cloth adequate to turn the competitive balance in favour of the powerlooms? If we assume a 12 percent premium on processed mill cloth vis-à-vis processed powerloom cloth the calculations presented in table 8 indicate the mills to be competitive vis-à-vis powerlooms by the yardstick of private profitability. For processed blended cloth, obviously the competitive position would be even more favourable for the mills.

Table 4.9: IRR of Mill and Powerloom (%)

| | Mill | Powerloom |
|---|---|---|
| 1. Grey cloth | 23.3 | 21.1 |
| 2. Processed cloth (without excise duty) | 30.6 | 28.7 |
| 3. Processed cloth (with duty) | 5.3 | 28.7 |

Source: S.Misra, p.99, Table 5.7.

How, then, have the powerlooms been able to out-compete the mills? The relative competitive strength of the two sectors cannot be determined merely by adding on processing costs. Fiscal levies have also to be contented with. Prior to the 1985 budget, cotton cloth produced in the decentralised sector was virtually free of duty if processed without the aid of power and had 30 percent lower duty than the mills if processed with the aid of power by independent processors. From the revenue yields, it was obvious that even the lower rate of duty was largely evaded, the extent of evasion in 1984-1985 being estimated at Rs. 100 crores for cotton fabrics alone.[24] While theoretically after the 1985 budget, processed cotton fabrics carry the same rate of duty whether they are processed in the mills or by independent power processors, in actual fact the duty at the fabric stage is borne almost entirely by the mills. According to an estimate, while the dutiable output of cotton cloth in the powerlooms sector was 37 percent higher than the mill sector in 1987-88, the duty collected was around nine times less, implying an evasion rate of more than 90 per cent. In 1987-88

[24] See "A note on rationalising the fiscal structure in respect of cotton yarn and fabrics", Department of Textiles (1985).

this gave on an average, advantage to the extent of Rs. 0.45 per metre of cotton cloth to the powerlooms.[25]

Misra[26] argues that even if we assume the same excise advantage -Rs.0.45 per metre, for the powerlooms in 1984-85 it is more than adequate to tilt the competitive balance decisively in favour of powerloom production. It will be evident from the wide difference in IRR values in table 4.8 with respect to processed cloth inclusive of duty, that even if a considerably lower degree of tax evasion by powerloom were postulated and much lower excise advantage assumed, the end result would not be significantly altered. The powerloom are able to pass the entire burden of excise duty to the consumers. Mills can do so only to the extent of the premium that the mill sector commands. Thus mill owners have no option but to accept considerably reduced margins or face the prospect of unsold stocks. It is the cumulative impact of lower wage costs in weaving and processing, lower overheads and the differential incidence of excise duties that ultimately tilts the competitive balance decisively in favour of powerloom cloth. In addition to this powerloom sector enjoys the flexibility built into operation, owing to the lack of labour regulations.[27]

### 4.6.2 Handloom vs. Powerloom

While handloom sector has the advantage over the powerloom sector in low yarn prices, low wage rates, low fixed capital cost and low overhead costs, it is at a disadvantage in productivity. A study on cost differential between handlooms and

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[25] P.Anubhai: "Sickness in Indian Textile Industry - Causes and Remedies, Economic and Political Weekly, 26 Nov., 1988, Table 16.
[26] *Op. cit.*, 1993, p. 101.

[27] Govt. of India: Report of the Committee to Review the Progress of Implementation of Textile Policy of June 1985, p. 20.

powerlooms conducted by the South India Textile Research Association (SITRA) in 1982 found that the ex-mill price was the same for hank yarn used by handlooms and corn yarn used by powerlooms. Therefore, the cost of corn yarns for the weaver would be higher to the extent of excise duty. A handloom weaver got an average wage of about Rs. 9.5 per day as against Rs. 12.5 for a similar operative in powerlooms. Yet wages paid to the handloom weaver per metre of cloth for weaving alone were high in relation to the wages incurred for similar operation in powerlooms. This was mainly because of low productivity of handlooms, one-third of that of powerlooms. As a result, handloom cloth was costlier than powerloom clothe by 14 per cent. The productivity of handlooms is low not only in weaving but also in the preparatory process. Consequently, wage cost of handlooms for the preparatory work is higher than that of powerlooms by 6 per cent. It also emerged that the overhead cost of handlooms was much lower than that of powerlooms. Finally, handloom grey cloth was costlier as compared with grey cloth produced on powerlooms by about 17.5 per cent.[28] Studies conducted by ATIRA and the Planning Commission also drew the same conclusions. All powerloom-processed cloth was cheaper than handloom processed cloth. The production cost of handlooms was marginally higher than that of powerlooms in drill, sheeting, long cloth and suiting. But the bulk of handloom output that competes with powerlooms consists of shirting, dhoti, mull, cambric, and poplin. For these items, handloom products were the more expensive. Goswami (1987) came to the conclusion that for the powerloom and handloom sector to produce same type of cloth at identical costs, the wages in the handloom sector would have to be negative. CTRA study found that if the handloom fabrics were processed by hand

[28] SITRA: Cost Differential between handlooms and Powerlooms, Coimbatore, 1982, pp. 4-10.

processors and powerloom fabrics by independent power processors then the cost differential would be less.

The above description clearly demonstrates that handlooms have cost disadvantage. How then have the handlooms survived? Or have they really? One school of thought argues that handlooms are being wiped out. The most articulate advocate of this point of view is Jain [1983]. Jain's main thesis is that a large proportion of what is officially shown as handloom production is in fact produced on powerlooms. As there is no detailed census of handloom, all estimates of handloom have to be necessarily based on quantum of yarn deliveries to this sector. This method is extremely unreliable because a large proportion of hank yarn meant to be consumed by handloom is diverted to powerloom and the statutory regulation of packing 50 per cent yarn in hank form is largely flouted by spinning mills.

Misra [1993] argues that there is no compelling economic incentive for converting hanks into cones for use by the powerloom sector in view of the additional cost involved. Moreover, it is misleading to argue that the phenomenal growth of the powerloom sector lends support to diversion theory since powerloom production is only partly based on spun yarn consumption. Filament yarn is a major raw material used in this sector. Further, the large number of powerlooms does not imply that all of them function at, or near, full capacity. There is, reportedly, considerable degree of sickness in this sector also.

Jain [1983] argues that in 1975, the survey of household purchase of cotton textiles revealed that the share of handloom and khadi in total household purchase was only around 16 per cent. The official estimates of cloth production placed the share of handloom at nearly 30 per cent for this year. This shows over-estimation of

production by handloom sector. Misra quotes per capita consumption of cotton textiles by sector of manufacture for year 1982-1987 and shows that the estimates of handloom production are very much consistent with per capita consumption data. Since 1974 the number of looms have remained virtually constant, thereby refuting the hypothesis that there has been a large-scale decimation of handlooms.[29] Although official statistics on handloom output are, in all likelihood, biased upwards, this error is due to the use of unrealistic conversion factors between yarn and cloth rather than for the reasons put forward by Jain.

Despite of many disadvantages handlooms have managed to survive. A combination of factors have prevented, or at least retarded, the process of their inevitable decline. The first and foremost is institutional support by the government. The handloom sector has oriented its pattern production so as to maximise its comparative advantage vis-à-vis the powerloom. Almost 55 per cent of the total handloom production are of coarse varieties of cotton cloth using yarn of counts below 20s. Around 70 per cent of handloom cloth are sold in rural areas where it is often locally produced. This makes handloom competitive on account of the transport costs involved. Further, handlooms have a distinct advantage in the production of cloth using multiple warps and wefts with short production runs. In sum, a differentiation of products and to a lesser degree of markets vis-à-vis powerloom production has enabled this sector to survive.

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[29] The Sivaraman Committee (1974) has reported the number of handlooms in the country to be 35.63 lakhs in 1974, of which around 30 lakhs were estimated to be commercial looms. Subsequently, the official Sub-Group on Handlooms for the Seventh Plan estimated the number of handlooms in the country in 1983-84 to be 38.64 lakhs of which 8 lakhs were non-commercial looms. In 1987-88, a comprehensive census of handloom was undertaken by the Government of India, according to which the current number of handloom is 38.91 lakhs of which 16.8 lakhs are domestic looms.

## 4.7 Policy and Its Implications

### 4.7.1 Before 1985

According to Misra [1993] an examination of the broad sweep of textile policy in a historical perspective reveals at least five salient concerns that have motivated policy although their relative importance has varied at different points in time. These are:

1. Regulation of inter-sectoral competition;
2. Provision of cheap cloth;
3. Fibre policy
4. Modernisation; and
5. Sickness and rehabilitation of mills

Even before independence, there was replacement of hand spun yarn by mill-made yarn. This resulted into exploitation of handloom weavers by middlemen. The Tariff Board suggested the reservation of certain fields of production for the handloom sector and the levy of a cess on mills with a view to fund the development of the decentralised sector.

After independence, the government adopted policies disadvantageous to the mill sector. In 1948, the acquisition and installation of powerlooms was prohibited without the permission of the Textile Commissioner. In 1950, excise duty was imposed on mill cloth of medium and coarse to superfine varieties. In 1950, certain varieties of cotton fabric were reserved for production exclusively by handloom and domestic powerlooms (units with less than 5 powerlooms). Because the government thought domestic powerlooms were as vulnerable as handlooms, they were put in the same category. Medium and large powerloom units were permitted to produce certain

varieties prohibited for composite mills. In 1953, a cess was levied on mill-made cloth to finance the development of the decentralised sector.

Textile Enquiry (Kanungo) Committee suggested that additional production of cotton cloth should be achieved through the decentralised sector. The committee depended on the basic view that, as far as possible, the production of basic consumer items had to be organised on a decentralised basis both from the viewpoint of providing the largest possible volume of employment, and that of eliminating unnecessary transportation and reducing the cost of distribution.[30] The committee recommended a phased scheme of conversion of handlooms into powerlooms on a co-operative basis to raise income of handloom weavers. The committee regarded powerlooms as technically advanced form of handlooms and considered the evolution of the industry from a predominance of handlooms to one of the powerlooms inevitable.[31]

This idea of freezing loomage in composite mills was supported by the Village and Small Scale Sector Industries (Karve) Committee. Karve Committee suggested freezing of loomage in mills as well as powerlooms and meeting the increased demand during the period of the Second Plan by expansion of handloom production. Therefore the Committee was against conversion. The All-India Handloom Board was opposed to conversion scheme and supported Karve Committee. Finally loomage in the mill sector was frozen from 1956 up to 1985.

The Second Plan envisaged the organisation of handlooms on co-operative lines. In the period of the Second Plan, the government introduced a scheme for the

[30] Government of India, Report of the Textile Enquiry Committee, 1954, p. 25.

[31] Ibid. pp. 7-8.

installation of 35000 powerlooms in the handloom sector. Although this scheme did not meet with full success but in this period a very large number of powerlooms have come into existence without any government help in contravention of the restriction placed on the acquisition and installation of the powerlooms. The government withdrew the conversion scheme in 1961.

The powerloom Enquiry Committee pointed out four reasons for the failure of the scheme.

(1) Insufficient financial assistance for working capital.

(2) Imposition of conditions for allowing the powerlooms in the handloom co-operatives in rural areas with population less than 30000.

(3) Absence of simultaneous arrangement, for providing pre-weaving facilities and post-weaving finishing arrangements.

(4) Absence of arrangement to ensure that the benefits of loom allocation were truly distributed among all members of the co-operatives

The committee recommended reinstatement of the scheme of phased conversion from handloom to powerloom on co-operative basis not only in cotton cloth but also in man-made fibre cloth. The committee suggested prohibition on expansion of loomage in mill sector until the end of fourth plan. Further, the committee suggested that the production of coloured saris should be reserved for handlooms and domestic powerlooms.

The conversion scheme did not succeed. Only handlooms set up a few of new powerlooms.[32] Two main reasons of the failure may be envisaged. First, there was

[32] Govt. of India, 1985, p.23.

strong opposition to the scheme from handloom interests.[33] Since handlooms were exposed to severe competition from powerlooms, handloom weavers could not believe that all of them would get powerlooms before some of them lost their employment. Second, it was not easy for handloom weavers with meagre resources to free themselves from the control of master weavers, let alone organise co-operatives and get financial assistance to convert handloom into powerlooms.

The 1978 textile policy froze the capacity of powerloom and mill sector at existing levels and allowed expansion only in the handloom and khadi sectors. Since it was impossible for only the handloom sector to meet the increase in clothing needs of the masses, this strategy was not implemented. The obligation to produce cheap cloth for weaker sections and sell to the government had been imposed on the mill from 1964. But as the production of controlled cloth was not profitable, it had been a financial burden for the weaker mills. Thus in the 1978 textile policy the subsidy would be given to the sale of controlled cloth from the mill and handloom sectors initially, and from the handloom sector eventually.

The Village and Cottage Industries Committee (1981) recommended the adoption of intermediate technology in handlooms, which consisted of a suitable mix of manual and mechanical process. The strategy not only saves drudgery and fatigue but also improves the quality of the product.[34] It tries to improve productivity of the handloom sector and raise the income of weaver without converting handlooms into powerlooms. In fact, while the total number of weavers decreased,[35] production by the handloom sector grew steadily in the 1980s because of increased productivity.

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[33] K.Sreenivasan: India's Textile Industry, Coimbatore, SITRA, 1984, pp. 118-19.
[34] Govt. of India: Report of Village and Cottage Industries, 1981, p. 18.
[35] Govt. of India, 1989, p. 31.

In spite of government regulation, the capacity of powerlooms has increased substantially year after year since the 1950s. In 1958-59 a census of powerlooms showed about 45000 powerlooms in existence. In 1985 there were about 6.5 lakh-authorised looms and a sizeable number of unauthorised ones. The unauthorised growth has taken place without any protection or assistance by the government. Although there were regulatory measures, their implementation was almost impossible because of the decentralised nature of production. Consequently, the government had to continue regularising powerlooms from time to time.[36] For example, both the 1978 and the 1981 statements set forth that the existing unauthorised powerlooms should be registered and regularised in payment of a fee.

**4.7.2 The 1985 Textile Policy**

The textile policy of June 1985 overturned basic principles hitherto maintained by past policies. The distinction between the mill and the powerloom sector was withdrawn. The 1985 textile policy dropped the freeze on the loomage in the mill sector and concession of fiscal levies on yarn used by the powerloom because powerlooms can maintain their advantage over mills without fiscal concessions.[37] Besides, regulation on capacity of processors in the organised sector by industrial licence was withdrawn. The independent power processors of powerloom fabrics have come up without ceiling on capacity. The 1985 textile policy took a step forward the multiple-fibre approach. It confirmed that consumer preference had shifted from cotton cloth to synthetic and blended fabrics.

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[36] Govt. of India, 1985, p. 17.

[37] Govt. of India, 1985, p. 23.

The 1985 textile policy largely did away with the physical curb on the growth of powerlooms. It also permitted increase of loomage in the mill sector. Units were allowed to contract capacities, including closure of a unit or thereof, wherever necessary and justified, provided the interest of the workers are fully protected. It was supposed that this approach would increase the degree of competition among units in the industry and create an environment conducive to a reduction in cost and an improvement in quality. This rested on the assumption that take-over by the government or nationalisation of sick mills with no reasonable expectation of becoming viable in a reasonable period of time was no solution. At the same time, the interests of displaced workers were not to be ignored.

The 1985 textile policy suggested following steps to promote the development of handlooms and to ensure higher earnings for the handloom weavers.

1. Intensification of handloom development through co-operatives and central/state level corporations.
2. Modernisation of looms and provision of technological inputs and infrastructure facilities.
3. Ensuring of adequate availability of yarn at reasonable prices.
4. Introduction of blended fabrics.
5. Reservation of articles for exclusive production.
6. Fiscal concessions to improve competitiveness of handlooms against powerlooms.
7. Improvement of the marketing.

Even now the powerloom sector is thriving and continuing to increase its share in cloth production. The change of policy has had no impact on unauthorised powerlooms. Powerlooms dominate over the mill and handloom sectors in fabric

production and have clearly been the most dynamic segment of the textile industry. But this success has depended on low wage labour. Even in authorised powerlooms, labour legislation was not implemented. The Hussain Committee pointed out bad working conditions in powerlooms and urged for the improvement of welfare of powerloom weavers. The survey carried out by the Labour Bureau in 1988 indicated that out of a sample of 3369 workers employed in units over the country about 66.2 per cent were working on a temporary basis. Various factors are responsible for this. The piece-rate system is in vogue in almost all units in the industry. Workers do not get any incentive even if they work for long hours. The size of the unit is knowingly kept small by the employer to avoid application of various labour laws. Under these circumstances, workers have tendency to shift to other units, which pay them slightly high wage rates, and there is high turnover and large number of temporary workers. Second, the incidence of migration is also very high in this industry. Moreover, in 128 out of 305 sampled units, work beyond the prescribed hours was observed. The important feature of all units working in excess of prescribed limit of working hours, was that they were not paying overtime wages as provided under the labour acts.[38] Besides, individual producers have little access to organised credit; working capital is provided informally by master weavers. Although the powerloom sector as a whole has developed rapidly, the financial basis of powerloom weavers is still weak and their income is low. They are more affected by the fluctuations of cotton yarn prices than mills.[39]

[38] Govt. of India, 1991, pp.10-12

[39] Govt. of India, Report of the Committee to Review the Progress of Implementation of Textile Policy of June 1985, p.20.

The number of persons employed in the handloom sector in many states is on the decline.[40] The salient fact about handloom waving is that the vast majority of weavers are poor. Whereas the average worker in a composite mill earns more than Rs. 50 per day and in powerloom about Rs. 25 per day, the average handloom weaver receives about Rs. 14 or 15. These workers remain below the poverty line even if there are two persons in a family fully employed in weaving and even after adjusting for rural and urban cost of living differences. [41]

The 1985 textile policy had called for a much more liberal stance toward expansion and modernisation of existing units. Correspondingly, the exit of non-viable textile units was to be made much easier. However, very few legal closures have in fact taken place. It is illegal closures that have increased over the years. One reason is the length of legal and other procedures involved in closure. Second, state governments have found it difficult to permit mill closures because of the widespread unemployment implications.[42]

Another major objective of the 1985 textile policy was to introduce all round modernisation in every segment of the industry from the handloom to the mill sector. According to the Hussain Committee, if appropriate modernisation takes place and if this induces a much greater proportion of production to be export-oriented, the overall effect would be to generate further employment and growth.[43] But this view overlooks the dichotomy of the mill sector. Big mills with the funds to introduce shuttleless

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[40] Govt. of India, 1989, p.121.

[41] Govt. of India, Report of the Committee to Review the Progress of Implementation of Textile Policy of June 1985, pp. 13-14.

[42] Ibid, p.22.

[43] Ibid, p. 30.

looms are producing fine cloth and exporting mainly to developed countries. Although their exports are rising, their main outlet is still the domestic market in which they enjoy oligopolistic benefits. Since shuttleless looms save labour input substantially, their introduction may not lead to increase in employment, unless mills take the risk of expanding capacity dramatically.

While most powerlooms are using plain looms, either displaced from mills or reconditioned or newly manufactured, a good number of automatic looms have come into use. Therefore the Hussain Committee predicted that 'as the organised sector modernises and installs newer machinery, the powerloom sector will also follow suit with some time lag'.[44] However, powerlooms generally produce coarse cloth, using discarded plain loom and unskilled labour, their advantage over mills being low costs of machinery. Modernisation wipes out the advantage. In any case powerloom owners do not have the funds to modernise machinery. It progresses very slowly in powerloom sector, except in those powerlooms receiving strong financial support under the control of big mills. Additionally powerloom owners can not have access to the fine cloth market.

Of late 'Textile Policy 2000' has been announced. At best it could be called as 'left out pages' of 1985 policy. Now it has become politically possible for the government to say what it wanted to say in 1985 policy itself. Liberalisation and globalisation have been accepted politically in India though their acceptance at grass root level by working class and peasantry could not be taken for granted. Textile Policy 2000 sets the following important target.

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[44] Ibid, p.20.

1. To achieve the target of textile and apparel exports from the present level of US $ 11 billion to US $ 50 billion by 2010 of which the share of garments will be US $ 25 billion.
2. To implement vigorously, in a time bound manner, the Technology Upgradation Fund Scheme (TUFS) covering all manufacturing segments of the industry.
3. To assist the private sector to set up specialised financial arrangement to fund the diverse needs of the textile industry.
4. To encourage the private sector to set up world class integrated textile complexes and textile processing units in different parts of the country.
5. To de-reserve the garment industry from the small-scale industry sector.
6. To strengthen and encourage the handloom industry to produce value added items and assist the industry to forge joint ventures to secure global markets.
7. To review and revitalise the working of the Textile research Associations (TRAs) to focus research on industry needs.
8. To transform, rightsize and professionalise all field organisations under the Ministry of Textiles to enable them to play the role of facilitators of change and growth.

Although it is too early to predict the effects of this policy but it is sure to increase the capital intensity of textile industry further and despite of all the talks of handlooms and powerloom their survival in long run is doubtful. Handlooms may survive, because of political compulsions, as a paralytic foot on body political but powerlooms in decentralised sector are going to witness a tough time ahead.

## 4.8 Technical Change and Modernisation

It is commonly assumed that mill sector in India is itself to blame for having failed to keep pace with technical change. The path to rejuvenation is supposed to lie in rapid modernisation. Mill sector operates with equipment of extremely old vintage. According to census of textile machinery carried out in 1979 around 85 per cent of the non-automatic looms were over 20 years old. The degree of technological backwardness of India in relation to some of the textile producing nations of Asia can be observed by percentage of automatic looms in total loomage. Even the low percentage of automatic looms in India considerably overstates the extent of automation in India, since it excludes preponderantly non-automatic powerlooms in the unorganised sector.

Table 4.10: Installation of automatic looms in selected Asian countries in 1985

| Country | Automatic Looms / Total Looms (%) |
|---|---|
| China | 92.1 |
| Hong Kong | 100.0 |
| India | 26.1$^{+}$ |
| Indonesia | 68.8 |
| Japan | 49.1 |
| South Korea | 61.3 |
| Malaysia | 100.0 |
| Pakistan | 100.0 |
| Taiwan | 100.0 |
| Thailand | 100.0 |
| Asia and Oceania | 73.7 |
| World | 82.1 |

$^{+}$ Excludes the organised sector.
*Source*: ICMF (1989), Table 65 and 66.

One common explanation provided for this technological backwardness of Indian textile is that there is unwillingness on the part of mill owners to plough back

the profit into the industry. But this factor alone can not provide a complete explanation. It implies collective irrationality or myopia, if investment in technical upgradation is otherwise profitable, which is obviously untenable.

The inhibiting effects of the policy environment apart, there are essentially three factors which may serve to explain why the modernisation impulse has been so weak in the textile industry. The first concerns the basic nature of the technological change in textile production taking place in the developed world. The second relates to the impact of the relative factor prices on the economic viability of the sophisticated technologies in the Indian context. Finally, the specific nature of the domestic market environment in which textile production takes place has had a critical influence on the incentives to modernise for individual producing units.

There is now a considerable body of evidence to support the thesis that technical change is, to a large degree, endogenous to the process of development rather than an extremely induced phenomenon.[45] In the field of textile production the constraint on labour supply, as reflected in rising wages, along with rising demand for high quality, defect free production in post-war developed countries led to the substitution of labour-intensive techniques by capital-intensive techniques. A modern mill using the most advanced techniques may use ten to fifteen times less labour as compared to a 'traditional' mill.[46] Consequently capital-intensity has risen very sharply. The other major development affecting the evolution of textile technology

[45] See, for example, Habakuk (1962); Ruttan and Hayami (1984).
[46] M.Amsalem: Technological Choice in Developing Countries, The Textile and Pulp and Paper Industries, MIT Press, Cambridge, Mass., 1983, p. 45.

has been the increasing use of synthetic fibres in textile production, which has facilitated use of high-speed shuttleless looms.[47]

The nature of technological evolution in the developed countries has, in a sense, limited its applicability in the Indian context. It is true that the modern production technologies usually lead to major reduction in recurring costs, energy consumption and raw material wastage. These technologies, however, are also considerably more expensive and therefore their introduction would be economical only if the savings in recurring costs more than offsets the vastly increased capital costs or the improved quality of the product enable commensurately higher value addition through better price realisation. Given the substantially lower level of prices in the Indian textile industry, not to mention the primarily cotton based manufacture, the introduction of such technologies could scarcely be expected to have the same compelling economic rationale as prevalent in the developed countries, except in the case of high quality, high value added production.[48]

In weaving greater automation and high speed weaving has been achieved by replacement of non-automatic looms by automatic looms resulting into reduction in wage cost. Shuttleless looms have achieved even higher speed by doing away with shuttles altogether. These modern machines involve substantially higher capital cost with a reduction in recurring costs. Misra (1993) presents comparative economics of

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[47] S.Khanna: "Technical Change and Competitiveness in Indian Textile Industry", Economic and Political Weekly, 26 August 1989.

[48] A study by ATIRA revealed that in respect of modern machines manufactured in India in 1976, the pay back period in most cases ranged from ten to fifty years (ATIRA, 1977, pp. 33-104). Further a study by Bhave, Kimothi and Paliwal demonstrated that high speed looms can be used to weave only

high priced, high value added cloth to be economically viable (in Gulrajani, 1983). Garde and Shanbhag (1984) reached similar conclusions in respect of rotor spinning and shuttleless weaving.

six alternative weaving techniques and calculates 'switch-over' rate of interest on the basis of cost data provided by Bhave, Kimothi and Paliwal.

Table 4.11: Comparative Economics of Weaving Machines

| Machine (Loom speed RPM) | Capital Cost (Rs. 000) | Recurring Cost (Rs. 000) | SIR (%) |
|---|---|---|---|
| 1.Non-Automatic (204) | 12.4 | 12.82 | --- |
| 2.Automatic (188) | 44.40 | 11.49 | Negative |
| 3.Automatic (250) | 56.14 | 15.12 | Negative |
| 4.Projectile (320) | 151.12 | 9.52 | Negative |
| 5.Rapier (280) | 107.88 | 8.18 | 1.56 |
| 6.Air-Jet (460) | 72.89 | 8.12 | 5.93 |

*Notes*:

1. Costs are for production of 10000 meters per loom per annum of blended shirting.
2. Capital cost includes cost of loom and factory space.
3. Recurring costs are only for items that differ and do not include cost of raw material.
4. Expected life of the capital stock is taken to be 25 years.
5. SIR (Switch-over interest rate) is the rate of interest that equates the additional capital cost of switching over from a non-automatic loom to the other looms with the present value of the savings in recurring costs aggregated over the life of the equipment- 25 years.

Source: Misra (1993), Table 7.3, p. 142.

It is evident from table above that among the modern weaving machines; air-jet looms seem to be the most promising. However, even here, unless capital is made available at a heavily subsidised rate of interest (below 6 per cent), it would not be profitable to replace plain non-automatic looms with air-jet looms. Given the high capital costs, the other machines are clearly out of consideration. More recent data assuming higher weaving speeds and greater savings in energy costs indicates that it may be economical to switch-over to air-jet and water-jet weaving at the prevailing term lending interest rates.[49] There is, however, some evidence to indicate that cotton yarn, unless specially treated, can not withstand very high speed weaving and therefore air-jet or water-jet does not constitute a feasible modernisation option for the

[49] SIRs calculated on the basis of the cost data contained in Vakil and Mehta (1986) worked out to more than 20 per cent for air-jet and water-jet looms.

majority of the composite mills producing ordinary cotton cloth.[50] Because of their superior strength only synthetic yarns are used in these high-speed looms, cotton yarn being unsuitable for high speed weaving. Indian textile industry is primarily cotton based and the organised mill sector even more so. Thus it is obvious that these high-speed capital-intensive looms have limited economic viability in low wage Indian markets.

The slow rate of market expansion had strong impact in retarding the pace of technical change. Since modern capital-intensive technologies are output augmenting, the market must expand enough to absorb this incremental output. There has been relative stagnation in per capita consumption of cloth in India and thereby pace technical change has been retarded [Chandrashekhar, 1984]. But Misra [1993] refutes this proposition on two counts. First, the relevant reference point for the mills is not the per capita demand for cloth but the level of demanded output per installed loom. Second, individual firms are not inhibited by the adverse impact of their investment decision on other firms. If technological upgradation enables a particular firm to strengthen its competitive strength vis-à-vis others, such investment will doubtless be made. It is not the rate of expansion of the market but its qualitative structure that has been more crucial in the Indian context.

A large majority of mills have been price taker, price ceiling being set by powerlooms. Of course some mills have introduced small technological improvements and been able to differentiate their product. Such improvements included better capacity utilisation, manufacture of stronger and more durable cloth and increased processing of cloth within the mills [Desai 1983]. Thus relatively

[50] Khanna, *op.cit.*

competitive conditions in a large segment of the cloth market have effectively restrained the penetration of sophisticated capital-intensive technologies which do not afford reductions in the overall costs of production.

While major part of textile production is for mass consumption where market is price elastic, some of the mills are able to command price premium. Obviously if quality is able to command commensurate price premium, the relative economics of the old and new technology would be substantially altered. In this small oligopolistic segment of the textile market where prices are not the primary determinant of demand, it becomes possible to introduce modern technologies, which although not cost effective, permit the manufacture of a better quality product. A study done by ATIRA has demonstrated, for modernisation to be viable in the Indian context, the cloth produced on sophisticated weaving machines must necessarily be high priced so that capital costs can be recovered within a reasonable period of time.[51] Thus there seems to be little doubt that modern sophisticated technologies are feasible only in small, high price segment of the Indian textile industry. This further explains the limited diffusion of such technologies in Indian context.

The conclusion seems inescapable that for a preponderant segment of textile production in India, the older generation technique represented by non-automatic loom is still the most appropriate. The point made by Pack [1975] is still valid in the Indian context- that given the relative factor prices prevalent in the less developed countries, the choice of older textile equipment would probably make much better economic sense than the introduction of the latest technology. In a similar vein, Rhee and Westphal [1977] found the non-automatic loom to be socially efficient in the

[51] Bhave, *et al., op. cit.*

early, 'textile led', phase of South Korean development. As Sen [1975] has observed, a technology that is most appropriate to the requirements of the developing countries does not necessarily imply that it has to be created afresh. The historical experience of the Japanese textile industry bears testimony to this fact.[52]

It seems that in the Indian context, for a vast majority of mills the key to an improved performance lies in the replacement and renovation of existing equipment rather than in large-scale technological upgradation. A number of studies have indicated that better results in improving mill performance can be obtained by more intensive machinery utilisation, introduction of work norms, rationalisation of surplus labour, etc., than by the induction of costly technologies.[53]

The overall production structure of Indian textile industry is geared towards catering to domestic market, export market being secondary. In 1950s India was the world's largest exporter of cotton textiles, but her exports of cotton textile have stagnated, so that her share in world export has been progressively decreasing since 1950. Although Government of India instituted export promotion measures, there was no expansion of exports. Developed countries have restricted imports of textiles from developing countries since the late 1950s. Quota restrictions under the LTA and MFA have affected exports from developing countries, but even so the Asian NIES increased their export of man-made fibre fabrics and garments after 1974 and became the main exporter of garments. Now, however, they are losing competitiveness due to rapid increase in wage cost. On the other hand, India's export of cotton fabrics stagnated so that her share in world exports fell between 1974 and 1992. Indian mills

[52] World Bank: World Development Report, Washington, D.C., 1987, p. 56.

[53] See, for example, Vidyarthi (1982); Rao and Garde (1982).

have not diversified and upgraded products actively. Moreover, the government had to adopt policies disadvantageous to the mill sector, which was main export sector, in order to protect the handloom sector. However, Indian fabrics still maintain a degree of international competitiveness. After the onset of economic reform since 1991, India's export of fabrics has grown faster than ever. Changes in world economic scenario, like, establishment of WTO and consequent phasing out of MFA, are posing an opportunity as well as a threat to Indian textile industry. When MFA expires on December 31, 2004, most of the product categories in which north America and Europe compete would have already seen free trade for at least a year while those which are crucial for Indian exports would then get off-quota. One implication of this back-loading agreement would be that Indian firms might start to see increased domestic competition from foreign firms. They will imports from other countries as well as entry of MNCs in existing domestic product segment as well, in addition to preparing for export market that would open up in 2005. These new firms would also bring in new products to the domestic market. The competitive environment is poised to change.

*CHAPTER: FIVE*

# AREA OF FIELD WORK AND METHODOLOGY

## 5.1 A Background

### 5.1.1 Locality

Kanpur is situated on the right-bank of the Ganges in the heart of Uttar Pradesh. By Indian standards Kanpur is neither ancient (like Allahabad) nor medieval (like Ahmedabad) nor modern (like Chandigarh). It is a product of transition that marked the rise and fall of the British rule in India. In 1778, Kanpur became a British cantonment. This created a demand for clothing, equipment and manpower. Consequently, the British East India Company established a factory. There was considerable activity in the manufacture of indigo and cotton. Kanpur played active part in the 1857 revolt. After its suppression, the Kanpur cantonment was considerably strengthened. Artisans met the requirements of the military. A large population of *Chamars* (cobblers) came to be concentrated in Kanpur to supply the troops with boots and other leather goods. The opening of the East Indian Railway in 1845 created new opportunities for economic activities.

By 1853 the population of Kanpur had reached 118000 and by 1901 it rose to 203000. Population of the city continued to rise rapidly in the present century to make it a major metropolitan centre of the country. By 1991 the population of the city had reached the figure of 2418487. The industrial work force in Kanpur numbered 13324 by 1911. Its growth was even more striking in the first half of the present century. By 1951 the number of workers in the industrial sector had crossed the figure of 1 lakh.

Table 5.1: Growth of Population and Working Force in Kanpur Agglomeration

| Item | 1971 | 1981 | 1991 | Percent Change 1971-81 | Percent Change 1981-91 |
|---|---|---|---|---|---|
| A. Population | | | | | |
| Males | 723641 | 908707 | 1325728 | 25.57 | 45.89 |
| Females | 551601 | 730357 | 1092759 | 32.41 | 49.62 |
| Persons | 1275242 | 1639064 | 2418487 | 28.53 | 47.55 |
| B. Workers | | | | | |
| Males | 363956 | 432733 | 485198 | 18.90 | 12.12 |
| Females | 13324 | 17855 | 22252 | 34.01 | 24.63 |
| Persons | 377280 | 450588 | 507450 | 19.43 | 12.62 |
| C. Worker's Participation Ratio (%) | | | | | |
| Males | 50.30 | 47.62 | 36.60 | -5.33 | -23.14 |
| Females | 2.42 | 2.44 | 2.04 | 0.83 | -16.54 |
| Persons | 29.58 | 27.49 | 20.98 | -7.07 | -23.67 |

*Source:* Census of India

Ironically while percentage change in population- male as well as female, is going up, the percentage change in workers and workers' participation ratio is steadily going down over the years. It is indicative of growing unemployment in Kanpur.

### 5.1.2 Industrial Structure

The proportion of the manufacturing workers to total workforce of the city increased from 20 per cent in 1921 to 45.9 per cent in 1951. Apart from becoming the biggest manufacturing centre in Northern India, Kanpur also emerged as a leading centre of trade and commerce as well as education. In fact, the service sector has been expanding at a much faster rate as compared to manufacturing since 1951.About three-fifths of the working force is engaged in the tertiary sector and nearly two-fifths in the secondary sector. The most important industrial categories are non-household industry, other services and trade and commerce.

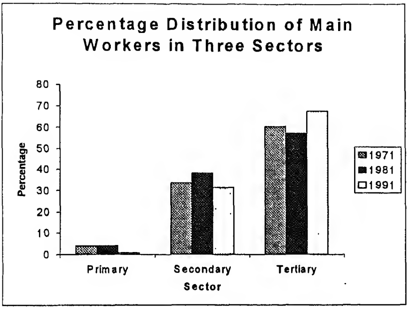
Table 5.2: Percent Distribution of Workers in Kanpur Agglomeration by Industrial Category, 1971, 1981 and 1991

| Industrial Category | Percent of Total Worker | | | Change in %Share | |
|---|---|---|---|---|---|
| | 1971 | 1981 | 1991 | 71-81 | 81-91 |
| Cultivator & Agricultural Labourers | 3.35 | 3.18 | 0.05 | -0.17 | -3.13 |
| Livestock, Forestry, etc | 0.48 | 0.91 | 0.69 | +0.43 | -0.22 |
| Mining & Quarrying | 0.04 | 0.07 | 0.02 | +0.03 | -0.05 |
| Total Primary Sector | 3.87 | 4.16 | 0.76 | +0.29 | -3.40 |
| Manufacturing, Processing etc | 34.37 | 36.17 | 29.47 | +1.80 | -6.70 |
| (a) Household Industry | 4.17 | 3.18 | 0.67 | -0.99 | -2.51 |
| (b) Non-Household Industry | 30.20 | 32.54 | 28.80 | +2.34 | -3.74 |
| Construction | 1.20 | 2.26 | 2.06 | +1.06 | -0.20 |
| Total Secondary Sector | 35.57 | 38.43 | 31.53 | +2.86 | -6.90 |
| Trade and Commerce | 20.93 | 19.38 | 28.32 | -1.55 | +8.96 |
| Transport, Storage and Communication | 8.60 | 8.09 | 7.83 | -0.51 | -0.26 |
| Other Services | 31.01 | 29.94 | 31.56 | -1.07 | +1.62 |
| Total Tertiary Sector | 60.54 | 57.41 | 67.71 | -3.13 | +10.30 |
| Total Worker | 100.00 | 100.00 | 100.00 | | |

*Source:* Census of India

The above table shows that the process of de-industrialisation of Kanpur has set in and tertiary sector is growing at a much faster rate. It is only 'trade and commerce' and 'other services' which have registered positive percentage change in 1991 as compared to 1981 and negative percentage change in 1981 as compared to 1971 in terms of distribution of workers. The magnitude of negative percentage change in household manufacturing has gone up in 1981-91 as compared to 1971-81, clearly proving decimation of household industry in Kanpur over the years coupled with the decline of non-household manufacturing too in decade 1981-91.

There have occurred significant changes in the industrial structure in Kanpur.




A.K.Singh[1] [1988] has shown the shift in the industrial structure on the basis of ASI data selecting 17 industrial groups at three-digit level from period 1974-75 to 1984-85.[2] While the number of factories had gone down over this period in case of the industrial groups 231 (cotton textiles), 312 (rubber products), 331 (semi-finished iron and steel), 343 (hand-tools and general hardware), 350 (agricultural machinery and equipment) and 353 (industrial machinery for food and textile industry) it has gone up in case of industrial groups 204 (grain milling), 205 (bakery products), 290 (tanning and finishing of leather), 291 (footwear), 303 (paints, vanishes and related products), 330 (iron and steel in primary/semi-finished form), 340 (fabricated metal structural products) and 380 (medical, surgical, scientific and measuring equipment). The number remained constant in case of groups 310 (tyre and tube), 313 (plastic

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[1] A.K.Singh: "Planning for Industrial Restructuring in an Industrial Metropolis- A Study of Kanpur", Interim Report, Giri Institute of Development Studies, 1988, pp. 7-8.

[2] Though the study is dated by 15 years we are of the opinion that the conclusions drawn still hold true and this trend may have accentuated further in subsequent period.

products) and 345(general mechanical engineering on a sub-contract basis). In terms of number of workers again 6 industrial groups show a rise, notably 205, 291, 303 and 380, while 11 groups show a decline. The decline was particularly marked in case of group 290, 310, 330 and 350. In terms of the value of output the more dynamic groups are 204, 205, 291, 303 and 353. Value of output registered a decline in case of groups 310 and 312. In value added terms the fastest growing groups are 204, 291, 303, 340 and 353. But value of output has gone down in case of as many as 6 industrial groups, i.e., 290, 310, 312, 331, 343 and 380. Significantly these groups also experienced a decline in the number of workers with the exception of the last group. As a result of the differences in growth rates the share of industrial groups has undergone changes over the period 1974-75 to 1984-85. Cotton Textile (231) has retained its prominent position in working force but has lost in terms of output and value added. Leather Processing (290) has also suffered a marked decline in its position as also Heavy Chemicals (310) and Iron and Steel (331). On the other hand Grain Mills (204), Bakery (205), Leather Shoes (291) and Plastics (303) show an improvement in their relative shares in industrial aggregates. Singh concludes that these 17 industrial groups as a whole have retained their share in employment, but lost in terms of other industrial aggregates indicating that some new industries are picking up in Kanpur.

The composition of work force in Kanpur on the basis of 1991 census needs a more detailed analysis. Age distribution of main workers in different industrial categories in Kanpur Nagar district[3] shows that the highest number of male as well as

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[3] In 1991 census Kanpur Nagar stands as a separate district, which largely corresponds with Kanpur Agglomeration. Since data on all aspects of Kanpur Agglomeration for 1991 is not available, it was considered prudent to use Kanpur Nagar district instead of Kanpur U.A.

female worker is found in age group 40-49. Generally the number of workers keeps on increasing with age, reaches the maximum in 40-49 age group and starts declining afterwards. The number of total female workers is twenty two times greater than that of total male workers. Manufacturing in household accounts for 0.67 per cent of male workers while this figure is 2.04 per cent for female workers. Excluding the category of other services, while the highest percentage of male workers is in non-household manufacturing (29.08) the highest percentage of female workers is found in category trade and commerce (12.55). In household manufacturing the percentage of female workers is higher than percentage of male workers across all age groups. While the percentage of female is highest in category other services in all age groups, in case of male percentage it is highest in non-household manufacturing in age group 5-14, 15-19 and 50-59 age group, in category trade and commerce in age group 20-24, 60-69 and 70-79, in category other services in age group 25-29, 30-34, 35-39, 40-49 and 15-59 age group. The percentage distribution of male and female workers out of their respective total shows that livestock and forestry, mining and quarrying, household manufacturing and construction are negligible for both genders. Major percentage of workers of both genders is engaged in category non-household manufacturing, trade and commerce, transport, storage and communication and other services.

On the basis of 1991 census the educational profile of main workers is obtained which is as following.

In terms of distribution the concentration is largely below secondary education in all-industrial groups in both genders. In category 'other services' significant number of graduates and post-graduates are present.

Table 5.3: Educational Profile of Main Workers as Percentage in their Respective Total for Male and Female

| Educational Category | Percentage of Male | Percentage of Female |
|---|---|---|
| Illiterate | 23.28 | 34.64 |
| Literate without Education Level | 5.74 | 5.24 |
| Primary | 10.16 | 5.90 |
| Middle | 13.88 | 5.52 |
| Matriculation/Secondary | 17.59 | 8.41 |
| Higher Secondary | 11.42 | 8.10 |
| Non-technical Diploma | 0.15 | 0.07 |
| Technical Diploma | 0.34 | 0.24 |
| Graduate | 11.11 | 13.43 |
| Post-Graduate | 5.03 | 12.87 |
| Technical Degree-Engineering | 0.51 | 0.76 |
| Technical Degree-Medicine | 0.34 | 1.16 |
| Technical Degree-Agriculture | 0.02 | 0.04 |
| Technical Degree-Veterinary | 0.00 | 0.01 |
| Technical Degree-Teaching | 0.39 | 3.58 |
| Others | 0.05 | 0.03 |

*Source*: Census 1991

The highest number of total non-workers seeking job are in education category- matriculation and intermediate. Moreover, the number of total illiterates seeking job is less than the number of graduates seeking job. The number of female job seekers is generally below male job seekers. It is only in education category-postgraduates and teaching where female job seekers are much more than male job seekers. Although concentration of job seekers in both genders is from category illiterate to intermediate, surprisingly the number of job seekers is very high in category- graduate and postgraduate as well in both genders from age group 15-19 onwards. Females outnumber males in age group 35+ in education category graduate and postgraduate.

Total number of persons never worked before is generally higher in lower education category. Category- intermediate records the highest number of persons

never worked before. At the same time category- graduate and postgraduate too record very high number of persons never worked before. This trend is found in both genders. Females never worked before in age group 30-34 is more than two times of their counterpart males. The never worked before males and females in age group 25-34 are found in education category- intermediate, graduate, postgraduate, engineering and medicines. Never worked before category is simply absent in 35+ age group.

Table 5.4: Distribution of Main Workers in Different Industrial Groups

| **Section , Division and Group of N.I.C.** | **Main Workers** | | | |
|---|---|---|---|---|
| | **Total** | | **Urban** | |
| | **Males** | **Females** | **Males** | **Females** |
| TOTAL | 511329 | 23437 | 486093 | 22302 |
| Agriculture, hunting, forestry & fishing | 4465 | 149 | 3479 | 104 |
| Mining & quarrying | 115 | 2 | 91 | 1 |
| Manufacturing | 152099 | 3100 | 146959 | 2743 |
| Manf. of cotton textiles | 26644 | 292 | 26314 | 289 |
| Cotton ginning, cleaning, bailing | 394 | 3 | 390 | 3 |
| Cotton spinning other than mills | 496 | 34 | 479 | 34 |
| Weaving & finishing of cotton, khadi | 109 | 3 | 107 | 3 |
| Weaving and finishing of cotton textiles on handloom | 1036 | 44 | 1020 | 44 |
| Weaving and finishing of cotton textiles on powerloom | 1310 | 16 | 1297 | 16 |
| Cotton spinning, weaving & processing in mills | 20634 | 160 | 20389 | 157 |
| Bleaching, dying & printing of cotton textiles | 2665 | 32 | 2632 | 32 |
| Electricity, gas & water | 7157 | 181 | 6982 | 175 |
| Construction | 11300 | 331 | 10288 | 218 |
| Wholesale & retail trade | 124053 | 2306 | 119197 | 2191 |
| Transport, storage & communication | 41066 | 483 | 39348 | 473 |
| Finance, insurance, real estate & business services | 22230 | 635 | 21861 | 625 |
| Community, social & personal services | 141715 | 15825 | 131061 | 15366 |

*Source*: Census 1991

The industrial classification of main workers shows that NIC-2&3 (manufacturing) division records the highest number of persons, males and females in total as well as in urban area.[4] One notable point is exceptionally high figure recorded by NIC-235 (cotton spinning, weaving & processing in mills) in all categories. The distribution of main workers in different industrial groups as per NIC is shown in table 4.

In household industry the highest number of total main workers is found in 'manufacturing'. This is true for male as well as female. And within 'manufacturing' the highest number is recorded by 'other manufacturing industries' which is very high in comparison to other industrial groups. Within 'manufacture of cotton textiles' the major part is contributed by 'spinning other than mills'. The number of female main worker is very low in whole 'cotton textile'.

In non-household industry total male worker is highest in 'manufacture of cotton textiles' and total female worker is highest in 'manufacture of non-metallic mineral products'. 'Manufacture of cotton textiles' ranks third in case of female workers. 'Cotton spinning, weaving & processing in mills' accounts for the highest number of workers within 'manufacture of cotton textiles' for male as well as for female workers.

[4] Since Kanpur Nagar district comprises mainly Kanpur City and some adjoining areas, the figures for urban area accounts for almost ninety per cent of the total.

Table 5.5: Distribution of Workers in Household and Non-household Industry

| Division | MAIN WORKERS IN HOUSEHOLD INDUSTRY | | | | MAIN WORKERS IN NON-HOUSEHOLD INDUSTRY | | | |
|---|---|---|---|---|---|---|---|---|
| and Group | TOTAL | | URBAN | | TOTAL | | URBAN | |
| of N.I.C. | M | F | M | F | M | F | M | F |
| Manufacturing | 3408 | 477 | 3026 | 391 | 148691 | 2623 | 143933 | 2352 |
| Food products | 139 | 20 | 120 | 19 | 8718 | 175 | 8129 | 162 |
| Beverages, tobacco & related products | 22 | 2 | 20 | 2 | 962 | 77 | 906 | 77 |
| Cotton textiles | 241 | 9 | 239 | 9 | 26403 | 283 | 26075 | 280 |
| Cotton ginning, cleaning, bailing | 0 | 0 | 0 | 0 | 394 | 3 | 390 | 3 |
| Cotton spinning other than mills | 155 | 2 | 155 | 2 | 341 | 32 | 324 | 32 |
| Weaving & finishing of cotton, khadi | 10 | 0 | 10 | 0 | 99 | 3 | 97 | 3 |
| Weaving and finishing of cotton textiles on handloom | 39 | 5 | 39 | 5 | 997 | 39 | 981 | 39 |
| Weaving and finishing of cotton textiles on powerloom | 23 | 2 | 23 | 2 | 1287 | 14 | 1274 | 14 |
| Cotton spinning, weaving & processing in mills | 0 | 0 | 0 | 0 | 20634 | 160 | 20389 | 157 |
| Bleaching, dying & printing of cotton textiles | 14 | 0 | 12 | 0 | 2651 | 32 | 2620 | 32 |
| Wool, silk & man-made fibre textiles | 5 | 3 | 5 | 3 | 2618 | 21 | 2567 | 21 |
| Jute & other vegetable fibre textiles | 2 | 0 | 2 | 0 | 2729 | 15 | 2683 | 14 |
| Textile product | 72 | 31 | 70 | 30 | 6711 | 139 | 6581 | 126 |
| Wood & wood products | 214 | 60 | 194 | 57 | 5380 | 108 | 5078 | 97 |
| Paper, paper products, printing & publishing | 43 | 8 | 43 | 8 | 3164 | 90 | 3093 | 90 |
| Leather & leather products | 187 | 13 | 182 | 13 | 17932 | 223 | 17762 | 220 |
| Basic chemical & chem. product | 27 | 10 | 24 | 8 | 6587 | 132 | 6435 | 129 |
| Rubber, plastic, petroleum & coal products | 27 | 2 | 27 | 2 | 2817 | 85 | 2718 | 83 |
| Non-metallic mineral product | 171 | 62 | 90 | 15 | 2922 | 342 | 2102 | 143 |
| Basic metal & alloy industries | 13 | 1 | 13 | 1 | 2639 | 33 | 2553 | 33 |
| Metal products & parts | 58 | 1 | 51 | 1 | 5738 | 63 | 5553 | 60 |
| Machinery & equipment | 26 | 0 | 24 | 0 | 16794 | 257 | 16430 | 254 |
| Transport Equipment & parts | 15 | 0 | 14 | 0 | 10527 | 178 | 10157 | 174 |
| Other manufacturing industries | 2082 | 251 | 1850 | 220 | 14860 | 311 | 14295 | 301 |
| Repair of capital goods | 3 | 0 | 2 | 0 | 2365 | 33 | 2297 | 32 |

*Source*: Census 1991

### 5.1.3 CHANGE IN TEXTILE INDUSTRY OF KANPUR

On the initiative of Mr. Buist, the then stationmaster of the East Indian Railway, Kanpur, an association called the Cawnpore Cotton Committee was started in 1860. This body was a joint enterprise of Indian and British merchants and military officers. This enterprising association got incorporated the *Elgin Cotton Spinning and Weaving Co. Ltd.,* 1861, which started functioning in 1864. During 1946-47 it became a subsidiary of British India Corporation, which in it came under government control later on. The two wars had given *Elgin Mill* an impetus to manufacture tents, cotton durries and ropes and in these branches of production the mill, popularly called the *Purana Putlighar* had established a reputation.

In 1874 with the joint effort of Indian and British merchants *Muir Mill* was started. For all practical purposes the company was a European owned and European managed concern till 1947. The Indians were kept because they could provide money in the formative years. When they had outlived their utility they were forced to disappear.

Mr. Johnwood, a former employee of the *Elgin Mill,* started the *Cawnpore Cotton Mill Company Ltd.,* in 1882. In 1921, the company merged in B.I.C. In 1959 the mill faced closure and was subsequently purchased by the *Elgin Mill* and it started functioning as *Elgin Mill No. 2.*

In 1886, Mr. Atherton West (an ex-weaving master of the *Elgin Mill*) set up the *Victoria Mills Co. Ltd.* In 1911, Mr.A.H.Horseman started *Swadeshi Cotton Mills.* The *Kanpur Textiles Ltd.* and *Atherton West Mills* were started in 1922 and 1923 respectively.

The first cotton mill to be brought into existence under complete Indian ownership is the *J.K.Cotton Spinning & Weaving Co. Ltd.,* which was established in 1921. The last cotton mill to come on the scene in Kanpur is the *Luxmi Rattan Cotton Mills* in 1934.

A study of brief history of the rise of the cotton mill industry in Kanpur shows that early entrepreneurs were British coming from the rank of the middle class- most of whom were brought up at the time of the maturity of the Industrial Revolution in England. When they found cheap raw material and cheaper labour in India, they could not resist the temptation of becoming pioneer industrialists. In this British venture, the Indian traders and moneylenders lent support as financiers, who were mostly Marwaris and Banias. In due course of time these Indian financiers were completely swallowed by the British mill owners. In the development of cotton mill industry in Kanpur, the *Elgin Mill* played a historic role.

Cotton textile industry has occupied a dominant position in the industrial structure of Kanpur since the beginning. Under the impetus of increasing demand the industry surged rapidly ahead during the inter-war years. Employment rose from about 12000 in 1931 to 42442 in 1951. After 1951, however, the growth of the Kanpur textile industry was arrested. Employment stagnated and was 43728 in 1965, i.e., only 3 per cent above the level reached in 1951. Output over this period rose by only 18 per cent, but it was 13 per cent less in 1965 as compared to 1956. In the next decade, that is between 1965 and 1975 employment in Kanpur textile industry declined by nearly 16000 or by 34.5 per cent.

Since the mid-fifties Kanpur textile industry has been facing a crisis of an unprecedented order. Over the years the industry has lost its competitive position vis-

à-vis other centre like Bombay and Ahmedabad. Most of the units are very old and machinery is worn out. The Kanpur mills mainly produce low count yarn and medium and coarse cloth and have not diversified their product. The cost of production is also higher in Kanpur due to low labour productivity, old machinery, higher price of cotton procured from far off markets and high power rates [A.K.Singh, 1988]. There have been frequent closures and strikes in the past [V.B.Singh, 1968]. The working of Kanpur textile mills deteriorated to such an extent that as many as 8 out of 9 working factories had to be nationalised. Out of 8 nationalised mills of Kanpur 5 are under the management of NTC and 3 under that of BIC. However, even after nationalisation these mills have not shown an improvement. Their losses are growing up continuously.

A.K.Singh [1988] has studied selected indicators of Kanpur textile industry for the period 1974-75 to 1984-85. Singh has shown that the number of factories over this period has gone down from 26 to 12. The number of workers has remained nearly constant. Invested capital, however, shows a substantial increase, nearly doubling over the period. Value of output shows a significant rise both at current and constant prices. However, the growth of output slackened after 1978-79. Value of output declined sharply in 1979-80 and again in 1981-82, but picked up after that. The trends in value added have been rather erratic. In as many as 6 years out of 10 it shows a decline over the previous year and was negative in 1982-83. Trends in net income also show a similar trend. Capital-labour ratio has gone up markedly over the period 1974-75 and 1984-85. Output-labour ratio also shows a distinct improvement till 1980-81, registering a decline after that. Value added per worker, however, has fluctuated violently from year to year and does not reveal a distinct trend. During this

period, invested capital at constant prices show a rise at the rate of 5.79 per cent per annum. Value of output at constant prices also registered a growth rate of 4.76 per cent per annum, but the growth rate of value added was only 1.43 per cent. However, trend rate for net income was negative. Capital-labour ratio has increased at a rate of 4.81 per cent per annum (at constant prices) and output-labour ratio at a rate of 3.71 per cent. However, value added as well as net income per worker show a negative trend. Employment elasticity with respect to output and value added were found to be positive for the period, though it was much higher with respect to output as compared to value added, being 1.431 and 0.316 respectively.

## 5.2 Methodology

### 5.2.1 Hypothesis

The present study proceeds with following hypotheses.

1. Choice of technique depends on many other variables, which are exogenous to the firm.
2. Variables, which are endogenous to the firm only partly explain the choice as it is made in real life.
3. Capital-intensive and labour-intensive techniques are not necessarily growth and employment maximising respectively as expected in conventional theory of 'choice of technique'.
4. It may not be rational to choose modern techniques and new machines.
5. The observed coexistence of techniques of varying factor-intensity viz., handloom, powerloom and mill in Indian textile industry, could not be explained in terms of static and restrictive 'choice of technique' model without incorporating

the structure of product and factor market along with other socio-economic variables.

To test these hypotheses the present study is located in textile industry of Kanpur. Textile is the oldest industry in India and once upon a time Kanpur was the pioneer in this sector, being dubbed as the 'Manchester of India'. Textile industry also provides the largest manufacturing sector employment in the country. Moreover, many a technological option is available in textile weaving. And lastly, the debate on 'choice of technique' at first started in the context of textile industry only. As such textile industry of Kanpur is a natural choice because of the historicity of textile industry in Kanpur which provides us ample scope to trace the reasons, associated with the question of 'choice of technique', responsible for decay of industrial cities. The availability of the whole spectrum of alternative technologies in formal as well as informal sector in Kanpur makes it all the more relevant.

## 5.3 Choice of Field Work Area and Sample Selection

Along with continued deterioration of organised mill sector there has been phenomenal growth of unorganised powerloom sector in Kanpur. Like elsewhere in India these two processes have gone in tandem in Kanpur too. Powerlooms came on scene in Kanpur in early sixties and grew rapidly in seventies. Handloom and mill sector had carved out a niche for them before the advent of powerloom in Kanpur in a form of mutual co-existence. Powerloom situated itself in between the two; thus affecting handloom and mill sector simultaneously. In course of time powerlooms have become the major part of textile industry of Kanpur.[5] The textile industry of

[5] The fieldwork for this study was carried out in 1995-97 and at this point of time except Elgin Mill No.2 all mills were closed. Even this mill was not running smoothly.

Kanpur consists of handloom, powerloom and mill sector. Powerloom sector is expanding rapidly at the cost of handloom and mill sector. The survey carried out in Kanpur focussed mainly on handloom and powerloom sectors of the textile industry. At the time of survey all mills except *Elgin Mill No.2* was found to be operating. Even this mill was working much below its capacity. So, it was considered appropriate to leave mill sector altogether. This state of mill sector could not provide us the comparability, which we were looking for.

### 5.3.1 Geographical Spread of Handloom and Powerloom in Kanpur

While handloom is spread out whole of the Kanpur Urban Agglomeration and adjoining rural areas, powerloom is conspicuously absent in adjoining rural areas. However, concentration of handloom is more pronounced in rural areas than urban areas. Handloom is wide spread in regions across the Ganges and towards Panki and Chakeri. This may be because of its being a rural occupation historically and lower overhead cost in rural areas. It was found that units in rural areas were doing better than units in urban areas. The latter type of unit fails to compete with other sectors in urban settings.

The spread of powerloom is limited by the availability of electricity, raw materials and maintenance services. Rural areas are either not electrified or inadequate in power availability. Moreover, higher speed of production in powerloom requires closer integration with market to minimise the gestation period and lead-time. Hold up of production or stock entails higher amount of loss in powerloom than in handloom. And lastly, handloom production may continue as an adjunct of agricultural occupation but it is not possible with powerloom. Handloom could be a

part-time business but powerloom is a full-time business. Therefore, no powerloom was found in rural areas and handloom is quite rampant in rural areas.

### 5.3.2 Demarcation of Major and Minor Clusters of Handloom and Powerloom

Though handloom and powerloom are spread out in whole of the city and adjoining rural areas, we demarcated major and minor clusters of handloom and powerloom in Kanpur. As said earlier, there is a strong tendency of clustering of units in certain pockets. Following clusters of handloom and powerloom were identified.

*Handloom*:

Major clusters: Chakeri (61), Chandari (53), Sujatganj (63), Railbazar (14), Faithfulganj (11), Nayaganj (29), Harbanshmohal (34) [all urban areas] and Rampurwa (47), Begambad (51), Bharaw (54), Sikariganj (49), Sonhara (50) [all rural areas].

Minor clusters: Kalpi Road, Birhana, Tewaripur, Nayabansh, Khemamai [all urban areas] and Sikandarpur, Mithura, Bithuna, Narwaipur, Panki, [all rural areas].

*Powerloom*:

Major clusters: Chakeri (43), Chandari (38), Sujatganj (36), Railbazar (45), Faithfulganj (26), Generalganj (28), Khapramohal (34) [all urban areas].

Minor clusters: Harbanshmohal, Banshmandi, G.T.Road, Puraina, Khokhartola [all urban areas].

Since number of units was found to be less than ten in minor clusters, it seemed prudent enough to drop minor clusters altogether from our list. The number of units in each major cluster was estimated on the basis of informed judgement. The number of units in each major cluster in both sectors was estimated, which is given in bracket. This estimate is based on informed judgement only. Out of these units it was

decided to draw out a random sample of 10% from each major cluster in such a way that the total number of units in our sample is equal to 50 in case of handloom and 25 in case of powerloom. To meet this requirement some minor adjustments were made in the number of sample drawn. Ultimately the sample size of 50 units in handloom and 25 units in powerloom was distributed as following.

| | |
|---|---|
| *Handloom* | *Powerloom* |
| Chakeri-6 | Chakeri-4 |
| Chaderi-5 | Chanderi-4 |
| Sujatganj-6 | Sujatganj-4 |
| Railbazar-1 | Railbazar-4 |
| Faithfulganj-1 | Faithfulganj-3 |
| Nayaganj-3 | Generalganj-3 |
| Harbanshmohal-3 | Khapramohal-3 |
| Rampurwa-5 | |
| Begambad-5 | |
| Bharaw-5 | |
| Sikriganj-5 | |
| Sonhara-5 | |

Since the number of handloom was found to be quite high in rural areas, there was a deliberate attempt to allocate at least half of the sample on units from rural areas. That is why out of total sample size of 50 units, 25 units are from rural areas.

As we see from above, Chakeri, Chanderi, Sujatganj, Faithfulganj and Railbazar are important urban clusters for handloom as well as for powerloom. These clusters are situated in Old City area. Muslims are in majority in all other clusters except Chakeri

and Chanderi. Weaving is the most important activity in these clusters. Apart from weaving, shoe making, repairing of automobiles, painting and vegetable or fruit selling were found to be other activities in these clusters. But the whole economy of theses clusters revolves around weaving and allied activities. This linkage is so strong that the price of a cup of tea or a beetle goes up or down in these clusters depending upon briskness of handloom or powerloom business. We found that the price of one plate of meal in these areas varies in accordance with variation in fabric and yarn prices. Our guess-estimate is that almost 70%-80% persons in theses cluster depend upon weaving for their livelihood directly or indirectly. We had occasions to see shops being closed down when there is downturn in weaving in these areas. This linkage of weaving with the whole of the economy of these clusters is so strong that business hours of shops situated in theses areas is set according to weaving schedule of *Karkhanas*.

Chakeri and Chanderi are situated on outskirts of city on Allahabad Road. Unlike earlier clusters, population in Chakeri and Chanderi is mixed. Here significant number of Hindus was found to be in weaving profession. But one interesting aspect of these clusters is that almost all-Muslim powerloom weavers have migrated from either Faithfulganj or Sujatganj with some previous weaving experience. Unlike this, Hindu weavers in these clusters were new to weaving and had no historical record of weaving in their family history. Our investigation revealed that the principal reasons for migration from Faithfulganj have been escalating land prices in Faithfulganj and establishment of defence establishments in these areas in late 70s.

Faithfulganj seems to be the hub of powerloom weaving in Kanpur. The first batch of powerlooms was established here only when some handloom weavers and

some erstwhile mill workers opted for powerloom weaving in late 60s and early 70s. That is why still today powerloom weavers from all over Kanpur look towards Faithfulganj for major decisions. Even the powerlooms owners association is situated in Faithfulganj and it is considered impossible to get elected to this association's office without support of Faithfulganj. Though handloom weavers are not as unionised as powerloom weavers still Faithfulganj is important for handloom too. Often new designs in handloom weaving originate from Faithfulganj. A highly skilled set of *ustad* is here who are capable of executing many intricate designs on handloom. There is a saying that "no design could be executed on handloom in Kanpur if *ustads* are unable to do so". These *ustads* are old veterans of handloom weaving. Ironically theses *ustadgiri* is dying out. There used to be proper training of handloom weaving in Faithfulganj under the leadership of these ustads. New generation of handloom weavers was given training of performing intricate designing on handloom. Now this institution of skill imparting is on the verge of extinction. While there used to be a large number of ustads in Kanpur in past, we could find only three ustads out of which two were from Faithfulganj.

Nayaganj and Harbanshmohal are adjacent to industrial area of city, almost at a distance of 5-6 Kms. in southeast direction from Faithfulganj. Theses two are one of many clusters of handloom weaving in Kanpur Urban Agglomeration. Apart from handloom weaving, leatherwork is very important in Nayaganj and plastic moulding is important in Harbanshmohal. The population in both areas is mixed.

Generalganj is basically a market for fabric and yarn situated nearby wholesale grain market of Moolganj. This used to be an area of handloom weaving in pre-independence period. Traders of yarn and fabric started settling in here after

independence to pursue their own business interest. It became an exclusive market place for fabric and yarn trading in due course of time. Some of those handloom-weaving families of past have now shifted to powerloom in Generalganj. Traders have established a few karkhanas of powerloom.

Khapramohal is situated in between railway station and Faithfulganj. Since it is situated on main road leading to railway station, the outside is a wholesale market of automobile parts and inside is used as powerloom sheds or karkhanas. Here Hindu middle castes were found to be in powerloom weaving. The spare parts as well as new looms are sold in Khapramohal in Kanpur. Traders selling spare parts or new looms have their own vested interests. These traders are always ready to sell new powerlooms or their spare parts to weavers on credit. The interest rate charged is very exorbitant. We had encountered many a situations where the weaver had paid more than three times the actual price of the loom over a period of five years. A large number of powerloom mechanics were found in Khapramohal who were erstwhile loom operators in mills.

All five major rural clusters of handloom, namely, Sikriganj, Rampurwa, Begambad, Bharaw and Sonhara, are as such outside the city limit of Kanpur. Technically they are even outside the district of Kanpur Nagar. But it was considered essential to capture units from rural areas in our sample to have a complete picture of handloom sector. Though there were some other clusters too but theses were selected because of their accessibility. Sikriganj and Rampurwa are on Unnao Road across the Ganges. Begambad is on Bilhaur Road at a distance of six kilometres from city limit. Bharaw is three kilometres away from Panki power station. Sonhara is seven

kilometres from Chakeri on Allahabad Road. Thus these clusters were selected from almost all sides of Kanpur.

**5.3.3 Selection of Units in Sample Clusters**

A random sample of units was drawn from these clusters as enumerated in section 5.2.2. An attempt was made to draw 10% sample and to keep the total number of sample fixed at 50 for handloom and 25 for powerloom. Therefore, some adjustments have to be made in the number of samples drawn. In all cases 2-3 samples were kept in reserve. Thus, practically the number of samples drawn was more than 10% of the total. There were situations when the unit in our sample was not co-operative enough. In this situations the units from reserve list replaced these units.

**5.3.4 Selection of Proprietors**

A separate list of proprietors was prepared. Out of 50 handloom units and 25 powerloom units, 29 proprietors for handloom and 17 proprietors for powerloom were identified. For this purpose the definition of proprietor used is not legal one. Any individual who was found to be generally responsible for the affairs of unit was regarded as proprietor. He or she may or may not be the legal proprietor of the unit. Out of the sample of handloom and powerloom those cases were altogether droped where there was either more than one proprietor or proprietorship was not clear enough. After this necessary correction in our list of sample units the number of proprietors to be studied remains as 29 in handloom and 17 in powerloom.

**5.3.5 Selection of Labour**

A total of eighty labourers were randomly selected to study labour issues separately. The distribution of these labourers is as following.

| | Weaver | Preparatory Labour |
|---|---|---|
| Handloom | 20 | 30 |
| Powerloom | 10 | 20 |

Though we tried to pick at least one weaver and one preparatory labour from each units of our sample, we could not manage to do that. One principal reason for this was fear of the employer. Labourers, weaver as well as preparatory, were not willing to speak out in presence of their employers. The way out found was picking up these labours when they came out of karkhanas, often at tea shops or their night shelters. One negative dimension of this approach was a missing out on female labourer. So we could not manage to interview female labourers. Whatever information we have of female labour is based on secondary sources.

**5.3.6 Method of Data Collection**

Collection of data in urban unorganised sector of Kanpur proved to be a Herculean task. This was all the more difficult in powerloom sector. None of the powerloom units surveyed was legally set up. The whole of the powerloom sector of Kanpur is violating some or the other legal provisions. Though 1985 Textile Policy legalised setting up of powerloom, there is still much provision that is systematically violated by these powerloom units. There is large-scale evasion of sales tax. Labour laws are not implemented. And above all, almost 70%-80% units are depending on power theft with active connivance of officials and junior staff of electricity department. Naturally these powerloom units are always apprehensive of checking by theses three departments. Any enquiry makes them apprehensive. Majority of powerloom units is operating on such a low profit margin that it is almost impossible to bear any incremental cost. We are of the opinion that it is rational on the part of powerloom

units to go for *Katiya* (illegal power connection) rather than to opt for legal power connection. The collection of data on powerloom units proved to be an uphill task in this environment of fear and distrust.

It was only after six months regular visit to field that information started tickling in. We had to participate in their agitation against electricity department. The high handedness of officials of electricity department was reported in local newspapers by the present author. Many letters were written in 'Letter to the Editor' section of local news papers airing the problems of powerloom weavers of different localities. The powerloom weavers association, which was not co-operative earlier on, started co-operating after having been convinced of the purpose of survey. This association went to the extent of flashing a message to all members to co-operate in this study.

Unlike powerloom units, handloom units had nothing to conceal and were co-operative and forthcoming with information. But while powerloom units do have some sort of account book, there is nothing like it in handloom units. Therefore, it was harder to collect information about last one year in handloom than in powerloom. Though this information was difficult to have in smaller powerloom units too. In these situations some guess-estimate has to be made.

Three schedules were administered (Appendix I).

Schedule I: Economics of weaving

Schedule II: Profile of proprietor

Schedule III: Profile of labour

Schedule I provides a detailed account of data on production, cost and composition of labour force of a single unit. This schedule captures profit and loss

account of the unit, along with decomposition of cost structure. The reference period is 'last one year' from the date of survey. Schedule II and Schedule III provides profile of proprietor and labour respectively. Both schedules detail the previous work experience, caste and religion and educational status of proprietors and labourers. The field work for this study was conducted from October 1995 to March 1997 in Kanpur.

**5.3.7 Explanation of the Concepts**

Various concepts have been used in these schedules. Sometimes these concepts have been either modified or used in a different way to suit the requirement of our field situation. Many a times our definitions go beyond the established meanings.

1. Fixed Capital

Instead of using total fixed capital (sum of land, building and plant and machinery), only plant and machinery is used as a measure of fixed capital. It was found that land and building are not a true measure of fixed capital in informal textile industry of Kanpur.

2. Working Capital

Two measures of working capital have been used. First, working capital is defined as total of current assets. Secondly, it is defined as equal to two months operational cost, i.e., one-sixth of total of raw material and wage cost on the assumption that there is two months time-lag.

3. Value Added, Surplus and Reinvestible Surplus

Since output is heterogeneous value added is used in place of output. Value added is defined as total receipt minus paid out cost. Deduction of paid out labour cost from value added gives the figure for surplus. It does not indicate the reinvestible fund because the consumption of family labour is met out from this surplus itself. To arrive

at the amount of surplus available for investment, i.e., reinvestible surplus, consumption of family labour is to be deducted from surplus arrived at as above. The marginal propensity to consume of family labour could be assumed to be unity. It means that the deduction of imputed value of family labour from surplus gives the value of reinvestible surplus. Thus,

Value added = Total receipt - Total paid out cost (excluding wage cost)

Surplus = Value added - Wage cost

Reinvestible surplus = Surplus - Imputed value of family labour

Rate of surplus is arrived at by dividing surplus by cost of plant and machinery.

4. Family Labour

There is very high incidence of family labour in handloom and powerloom in Kanpur. So the number of hired labour does not provide the total labour absorption by excluding family labour. The utilisation pattern of family labour does not permit calculation of labour time. So, based on our field experience, different categories of family labour are adjusted in following way.

Weaver = 1 unit of labour

Preparatory-male = 2/3 of 1 unit of labour

Preparatory-female = ½ of 1 unit of labour

Preparatory-child = ¼ of 1 unit of labour

Supervisory = ½ of 1 unit of labour

Based on respective wage rates of different categories of labour, value of family labour is imputed accordingly.

5. Factor Intensity and Factor productivity

Two measures of factor intensity have been used, namely, capital-output ratio and capital-labour ratio. Capital-output ratio is defined as plant & machinery divided by value added (P&M/VA) and capital-labour ratio by plant & machinery divided by total labour (P&M/NL). Total labour (NL) is equal to hired labour (NE) plus adjusted number of family labour.

Likewise capital productivity and labour productivity are defined as VA/P&M and VA/NL respectively.

6. Inputs Required to Produce Value Added of Rs. 10000

Labour units are adjusted according to number of shifts and number of working days assuming that one man-day consists of eight hours of work. Mandays required in producing value added of Rs. 10000 is calculated and based on this other inputs like, land and building and working capital are calculated.

7. Year of Establishment

The age of unit is counted from the date when the unit was first established. The problem with this was that most of the smaller units were working intermittently or had changed ownership in between. It was counted from the date when it came into ownership of present proprietor.

8. Main Product

Although in most of the cases main product was clearly identified, there were cases where the concerned unit had produced more than one item during the year. Had there been multiple number of items produced during the year, the identification of main product would have been difficult. Fortunately, in no unit the number of items produced during the year exceeded more than two. Therefore, we considered those

items as main product, which contributed more than 50% of total value added during the year.

9. Number of Looms Installed and Working

While powerlooms are permanently fixed, handlooms are easily dismantble. Therefore, handlooms are set up as and when required. We had to go by the proprietor's own admission of the number of loom they have. Though it was ascertained in powerloom, it was not possible to do so in handloom. The number of looms actually working on survey date was treated, as number of looms working.

10. Manufacturing and Job-Work

A unit is considered as manufacturing unit if it buys raw material and sells the product. Job-Work units are those which do not buy raw material and sell their product but they are supplied raw material from some other and these units charge a pre-determined conversion rate. All those units that had done both type of work in last one year are classified as 'mixed'.

11. Scale of Production

Generally scale of production is defined in terms of the total amount of investment. That is the definition used in policy analysis. But we have used an alternative definition of scale in terms of the number of looms. We define it as following.

| | |
|---|---|
| Small-scale | Less than 5 looms |
| Medium-scale | Between 5 to 10 looms |
| Large-scale | More than 10 looms |

This definition of scale was adopted to observe the effect of variation in scale on 'choice of technique' and to test the proposition that 'choice of technique' is ultimately choice of scale only.

### 5.3.8 Method of Analysis

The relationships between different variable are examined by grouping method. Different variables are grouped and compared with grouped values of other variables. This method is used to unearth relationships among variables. Simple arithmetic mean is used to find average values. But there are situations where there are wide variations. In theses situations instead of using arithmetic mean we have used geometric mean, though it hampers its comparability with variables where arithmetic mean has been used. Since data on wage payment for whole of the last year was not available, we have to estimate wages indirectly, i.e., through cost data supplied by the unit. In calculation of 'inputs required to produce value added of Rs. 10000' wage cost is calculated by converting labour days into labour hours and suitably adjusting other costs.

*CHAPTER: SIX*

# HANDLOOM AND POWERLOOM IN KANPUR

## 6.1 Broad Description

### 6.1.1 Location

A unique feature of the textile industry of Kanpur is the concentration of handloom and powerloom units in certain pockets in the city. Within the city, though the number of handloom units are limited, they coexist and thrive with powerloom units in certain pockets viz., Faithfulganj, Railbazar, Sujatganj, Chakeri, Chanderi and some other areas adjoining to the large mills. Apart from the above major clusters, which are common for handloom and powerloom, there are some exclusive clusters of handloom and powerloom in city itself. These are Nayaganj & Harbanshmohal and Generalganj & Khapramohal for handloom and powerloom respectively. Generally, handloom and powerloom sectors are present together in urban areas. Most of the clusters in Kanpur show this feature. The principal reason for this phenomenon is that powerloom weavers of today are handloom weavers of past. The process of conversion of handloom into powerloom started in Kanpur in late 60s and early 70s. This got further momentum in 80s. It was partly a lagged result of government's conversion scheme and partly an autonomous rational economic decision on the part of handloom weavers due to falling profit margin in handloom sector. This change in technology warranted change in whole organisation of production. But same set of

handloom weavers switched over to powerloom production without changing organisation and mode of production.

Handloom sector, which is decimated by the powerloom sector within the city, shows strong presence in the peripheral and adjoining rural areas of the city; and powerlooms are altogether absent in these areas. Like elsewhere in India, handlooms are quite common in rural areas around Kanpur. Five important clusters of handloom around Kanpur U.A. could be identified. These are Rampurwa, Begambad, Bharaw, Sikriganj and Sonhara. An important tendency of powerlooms and handlooms, as noted in Kanpur, is their tendency to survive and prosper in clusters. There are several sorts of horizontal and vertical linkages among different units. Textile mills are located within the city only. Although most of the mills have closed down, some of them are still operating, probably to minimise their loss only. This clustering of handlooms and powerlooms in particular areas provides economies of scale, from demand as well as supply side.

**6.1.2 Clustering**

It is rare to find a single handloom or powerloom unit operating in isolation in Kanpur. Rather they thrive in clusters. Two principal reasons could be delineated.

Firstly, there are certain economies of scale associated with clustering. Weaving in handloom or in powerloom is composed of a bundle of tasks, like, bobbin making, warping, wefting, beam making, reeling of yarn, dying, finishing of fabric and weaving. Except weaving all other tasks are semi-skilled in nature. Majority of units, especially smaller ones, finds it profitable to get these works done on contract basis from outside. That is why a number of units specialising in this preparatory work have sprung up in these clusters. Although preparatory works are essentially labour-

intensive and manual but over a period of time a fair amount of mechanisation has creep in these works too. Moreover, higher volume of production in these units along with mechanisation has helped in bringing down the cost of production. Therefore, smaller handloom and powerloom units opt for putting out rather than to do it by themselves. These smaller units specialising in preparatory work could survive only when there are large number of handloom and powerloom units around. Since share of cost of preparatory work is a very small part of the total cost of output theses units are not in a position to afford transportation cost. That is why geographical distance becomes important. Thus clustering of handloom and powerloom units makes sound economic sense.

Secondly, historically Faithfulganj is the hub of powerloom and handloom weaving in Kanpur. Once upon a time it was the only cluster in Kanpur. Over a period of time weavers from Faithfulganj migrated to other areas of the city. The major clusters of handloom and powerloom today are those where this migration had been in block. A whole bunch of weavers from Faithfulganj migrated to Chakeri, Chanderi and Sujatganj. Even today weavers of other clusters do have some or the other relative in Faithfulganj. This clustering of handloom and powerloom units is tremendously facilitated by endogamy and preferential forms of marriages found in Muslims and backward castes of Hindus. Since these forms of marriages, especially cross-cousin marriage, confer some sort of property rights too, there is little incentive to spread out of parent cluster.

**6.1.3 Ownership**

The question of ownership is of greater importance in powerloom sector. Ownership is often unclear and unimportant in handloom sector. This is so because worth of

assets is very low in handloom than in powerloom. It is compounded by the fact that handlooms are generally residential and ownership of residence is different from ownership of loom.[1] Broadly three forms of ownership could be distinguished.

Individual ownership means ownership of a single individual. Moreover, the legal ownership of unit is very difficult to determine in our sample. Out of 50 handloom units and 25 powerloom units it is found that the clear-cut case of individual ownership is limited to 58% in handloom and 68% in powerloom. The rest of units are as such either in family ownership or in partnership arrangement where more than one individual has pooled their money to raise capital stock. The arrangement is largely in terms of resource sharing where land owner, loom owner, capital owner and weaver come together with their own resources. Generally in all partnership in handloom, weaver is present as a partner, combining with other agencies. But in powerloom capital owner usurps the position of weaver where partnerships are formed on the basis of sharing of either capital cost or joining together of capital and other agencies excluding weaver. This suggests that the weaver is reduced to a category of labour- skilled labour in powerloom production. In our sample partnership arrangement is found in 8% units in handloom and 25% units in powerloom. Family ownership is found in 34% units in handloom and 7% units in powerloom. In this form of ownership it is the family which owns the unit rather than any member of the family. Of course any one member of the family may look like being in-charge of business. Often we observe this form of ownership in joint or extended families. Higher percentage of family ownership in handloom than in powerloom suggests that handloom production is based on old social order. This is corroborated by the fact that

[1] We define ownership as ownership over the Karkhana rather than ownership of loom only.

incidence of family labour is higher in handloom than in powerloom. Similarly, higher percentage of partnership arrangement in powerloom than in handloom indicates higher capital investment required in powerloom production.

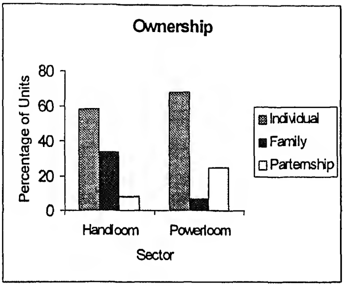


*Figure 6.1*

### 6.1.4 The Proprietor

The weaver is not essentially the proprietor of the unit. While weaver is skilled labour only, proprietor is the bearer of risk and uncertainty and consequently stakes a larger claim on profit. Of course the proprietor do manages to involve labour in its risk bearing but labour is not compensated accordingly. The proprietor is not essentially involved in actual production. At most of the time he is engaged in supervisory work.

Partnership firms are not common in handloom. But in powerlooms partnership firms exist. In both sectors some temporary arrangements are made giving a semblance of partnership where more than one weaver join together for a limited period on the basis of loom or space sharing. There are cases where a space owner

and a loom weaver combine together in production in handloom. At the most of times this arrangement is temporary and lasts only till a particular order is completed. In some cases it is joining together of input owner (or supplier of raw material and capital) and weaver. In powerlooms the situation is a bit changed. Powerlooms are relatively inflexible. Naturally the owner of powerloom enters into any agreement always along with his loom. In this case the owner lets out the powerloom along with the space to the weaver on profit sharing basis. There are many variants of partnerships in handloom and powerloom, depending on the exigencies of time and local conditions.

In this study it is attempted to find out the profile of proprietors of handloom and powerloom sectors of Kanpur. The following results emerge.[2]

This is obvious from table 6.1 that there is predominance of Muslim community in informal textile sector of Kanpur. Of course there are Hindu community too. Moreover there is complete absence of upper caste groups, be it Hindu or Muslim, in textile weaving. Weaving is regarded as inferior work in both communities. This is in sharp contrast to labour of mill sector where Hindu and Muslim labour are large in number.[3]

One interesting point of Muslim proprietors is their perception that usury is a sin. This perception forbids charging of any interest in any form. The word used for interest in pockets of handloom and powerloom is '*haram*'. This perception has helped a great deal in thriving of Muslim proprietors. Interestingly these same proprietors do pay interest on capital or yarn they receive from traders of Generalganj.

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[2] This is based on survey of individual proprietors only, which are 29 in handloom and 17 in powerloom.

[3] See V.B.Singh and A.K.Singh.

This perception of usury is reinforced by the practice of 'preferential form of marriage' in Muslims, Where, proprietors are related with each other in some sort of kinship or alliance relationships.

Table: 6.1 (in numbers)

| | Handloom | Powerloom |
|---|---|---|
| **A. Religion & Caste** | | |
| Hindu | 9 | 4 |
| Upper Caste | 0 | 0 |
| Middle Caste | 3 | 0 |
| Lower Caste | 6 | 4 |
| Muslim | 20 | 13 |
| Upper Caste | 0 | 3 |
| Middle Caste | 4 | 7 |
| Lower Caste | 16 | 3 |
| **B. Native Place** | | |
| **Migrated** | 7 | 13 |
| **Not Migrated** | 22 | 4 |
| **A. Experience** | | |
| 10 years | 2 | 6 |
| 10-30 years | 11 | 11 |
| More than 30 years | 16 | 0 |
| **B. Other Business Interests** | | |
| Yes | 2 | 9 |
| No | 27 | 8 |
| **C. Family Involvement** | | |
| Wholly Family | 9 | 3 |
| Partly Family | 18 | 7 |
| Individual | 2 | 7 |
| **D. Willingness to Shift to Other Profession** | | |
| Yes | 25 | 4 |
| No | 4 | 9 |
| Can't Say | 0 | 4 |
| **E. Education** | | |
| Illiterate | 17 | 0 |
| Primary | 8 | 3 |
| Secondary | 3 | 9 |
| Graduate | 1 | 3 |
| Postgraduate or Technical | 0 | 2 |

*Notes:*

1. If the proprietor has migrated in first generation he is considered as migrated.
2. Experience is counted in same sector.
3. Family involvement is defined in terms of whether the whole family or some members of family or no other member of family is involved.

*Source: Field Survey*

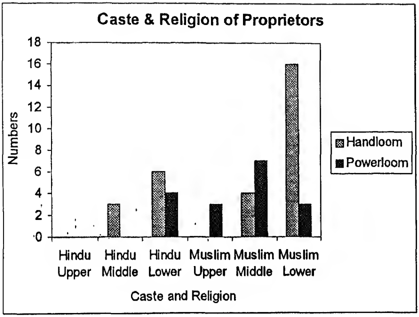


*Figure 6.2*

There is a religious sanctity in handloom weaving. Every handloom proprietor makes it a point to produce *Ja-namaz*[4] on Fridays, no matter whether he is a Hindu or a Muslim. This perception is rooted in historicity of tradition of weaving especially in Muslims. One common refrain of handloom proprietors is their tendency to identify weaving with their tradition where doing weaving is regarded as continuation of family tradition. The statement made is- "*how can we leave the profession of our forefathers. This is a craft which has been bestowed to us by the all mighty God*". This feeling is all the more evident in older generation of handloom weavers. It goes to verify the often-quoted statement that handloom weaving is not purely a commercial activity. Since powerloom is newer technology, which is not rooted in tradition like

[4] A piece of Dari on which Muslims pray.

handloom, it is relatively commercial activity. That is why powerloom proprietors are much more responsive to market signals than handloom proprietors.

### 6.1.5 The Weaver

Traditionally, weaving has been a village industry throughout India with predominance of the members of the Muslim community, namely, '*Julahas*'. This holds true for the whole of the unorganised textile industry of Kanpur as well. Apart from some traditional Hindu weavers, of late, here a significant number of the members of other Hindu OBC have also entered into this profession.

The weavers are educationally backward. Below matriculation level of education is a rule rather than an exception. Average family size consists of five or more members. Joint family or extended family is common. Almost all weavers in handloom have weaving as their family tradition. In powerloom some cases are reported where weaving was not present in family history. People related to such cases are generally engaged in firms of large size. In urban areas weaving is the only occupation of weavers. In rural areas weavers generally combine weaving with their agricultural activities. This gives weavers of rural areas some space and some other source of income to fall back upon. Obviously weavers in urban areas are more susceptible to market fluctuations.

### 6.1.6 Age of Unit

Handlooms have a very long history in Kanpur and its adjacent areas. In our sample, some handloom units are found which are established as early as in 1950s. But the history of handlooms in Kanpur goes back to early twentieth century, coinciding with the arrival of Britishers in Kanpur. In this period weavers from different parts of country came in here in large numbers and produced handloom items of super quality.

Interestingly, handloom sector and mill sector sprang up in Kanpur at same point of time. Rather it could be said that mill sector prepared the ground for the handloom sector. This is in sharp contrast to experiences of other parts of the country where it was the handloom sector, which made the ground for the mill sector. After independence it started having tough time. Only a few units are established in 1990s.

Establishment of powerlooms started in Kanpur in the late sixties or early seventies. The advent of powerloom coincides with the closure of some mills in Kanpur. In late sixties mill sector started witnessing sickness resulting into nationalisation of some mills and closure of some others in the seventies. The labour and looms of the closed mills sector found their way in the unorganised and informal powerloom sector. That is why no powerloom unit in Kanpur can be found which is more than twenty-five years old and the looms they use are mostly second hand i.e. looms discarded by mills.

Establishment of mills were started in Kanpur in early twentieth century and once Kanpur was known as the 'Manchester of India', largely due to the organised textile mills. These mills having a chequered history are on the verge of extinction now.

In our sample in handloom the reported maximum age, minimum age and average age are 45 years, 2years and 17.98 years respectively. These figures for powerloom are 26 years, 1 year and 11.92 years respectively.

**6.1.7 Residential Status**

Residence has dual purpose in informal sectors; one part is used as residence of the family and the other part is used for commercial purposes. In our sample most of the handloom units are residential (82%) where residence is used for both purposes. Non-

residential units are merely 13% in handloom sector. The percentages of residential and non-residential units are 42% and 54% respectively in powerloom sector. The status of unit was found difficult to determine in 5% and 6% units in handloom and powerloom respectively. In these units residential area and commercial area are indistinguishable.

Often, residential units are small units having less than five looms. In our sample the percentage distribution of small, medium and large units in residential and non-residential units is as following.

Table 6.2 (In %)

| | Handloom | Powerloom |
|---|---|---|
| (A). Residential | 82 | 44 |
| Small-scale | 48 | 32 |
| Medium-scale | 26 | 8 |
| Large-scale | 8 | 4 |
| (B). Non-residential | 14 | 52 |
| Small-scale | 0 | 4 |
| Medium-scale | 4 | 16 |
| Large-scale | 10 | 32 |

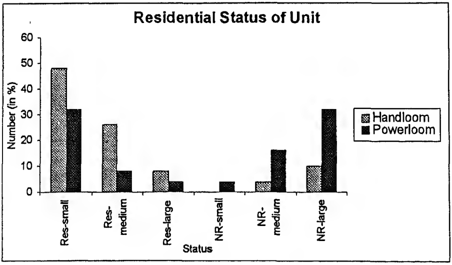


*Figure 6.3*

It is obvious that residential status of unit has some thing to do with the scale of production. Separation of residential area from commercial area is possible only with higher volume of production. Since most of the units in urban area are located in old city area where land prices are very high, it does not make economic sense to have a separate commercial space with low volume of production. Even when the land price is not that high in rural areas of handloom, the volume of production and profit margin are not enough to support additional capital cost in the form of land and building. Investment in land and building might have been incurred, had there been certainty of even this narrow profit margin and low volume of production not going down further in projected time period.

One interesting observation is that upper caste or middle caste owners prefer to have their residence separated from commercial area. This is due to the fact that preparatory work and weaving is performed by lower castes, like *Julaha* (Hindu) and *Ansari* (Muslim), which are considered as untouchable[5] in traditional caste hierarchy.

### 6.1.8 Skill Content

Automation has the negative of alienating the labour from its product by snatching away the individuality of labour. The weaver looses its creativity in automatic or semi-automatic looms. The ultimate product's quality is determined by technological specification of the machine, not by weaver's dexterity. Machines homogenise the weavers.

There is a lot of opportunity for individual weaver's creativity to get reflected in handloom production. But this opportunity is considerably reduced in powerloom weaving. Once upon a time very intricately designed fabrics were being produced on

handloom in Kanpur. There were many expert weavers in handloom sector, called *Ustad*, in Kanpur. These *Ustads* were institutions in themselves, imparting training to younger generation of weavers. Now market forces are wiping out this tradition of *Ustads*. Handlooms are forced to produce items like *Dari* where this expertise is no longer required; thus robbing off the uniqueness of handloom production. Then could it be said that skill content has no role to play in handloom production? Out of three *Ustads* found in Kanpur, two were working in a handloom unit in Faithfulganj. This handloom unit stands out as the most profitable and the largest handloom unit in Kanpur having a large exports market. The President of India has awarded the proprietor of this unit in trade fair in New Delhi. Ironically this unit is not producing *Dari* at all but exporting decorative pieces of very complex designs made on handloom to overseas market. Obviously it is the skill component that is involved in its production which has made this unit so successful. The core competency of handloom sector lies in production of intricately woven fabrics, not in fabrics with very low skill component. But there could not be collective myopia. Had there been feasibility of earning higher profit by relying on skill aspect of production, the institution of *Ustads* would not have died out. There would not have been so wide spread production of *Dari* on handloom. There need to be an explanation of this going beyond the skill constraint.

At the same time scope for executing intricate designs are limited on plain powerloom. Some costly attachments need to be used with the type of looms being used in Kanpur. These powerlooms can not produce wider cloths and fabrics involving designing. Apart from these technological limitation there are many

[5] This is different from the sense in which the world 'untouchable' is used. Here it is used in the sense

structural constraints as well. These are absence of processing houses in Kanpur, lack of working capital and lack of demand for designed fabrics. Therefore, powerlooms are left with no option other than producing items like canvass where neither dying nor designing is required. This does not augur well for skilled weaver of powerloom. His skill is no longer at a premium. He is reduced to a simple labour having nothing unique about him. That is why powerloom weavers are called *Mistri* (mechanic) in Kanpur.

## 6.2 Labour Issues

### 6.2.1 Profile of Labour

As said above weaver is skilled labour and preparatory work is done by unskilled labour, though some degree of skill is required in preparatory work too. Preparatory work constitutes beam making, bobbin making, sizing, dying and transportation of materials. Except the last one all other activities are semi-skilled in nature. While the skill requirement in powerloom is much less than what it is in handloom in both categories of work, powerloom requires some other qualities on the part of labour. Powerloom labour has to keep pace with a machine which is much faster than handloom and whose running is beyond his control. And this requires high degree of quickness, punctuality and agility on the part of labour.

Weaver is the most important part of labour pool. In handloom, weavers have to sit in a pit, dug out in earth, from dawn to dusk and even beyond that, picking the threads in badly lighted workstations. These uncemented pits are cause of many afflictions. Sights of an old man sitting in a pit with a thick glass on his eyes trying to find the appropriate thread in light of a lantern is quite common. Sometimes this

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of caste system based on the concept of pollution and purity.

lantern is replaced by a dim light bulb. In powerloom, the weaver is in a standing posture for more than 8 hours in a day tending to 2-3 looms at the same time. While powerloom in itself requires lower degree of skill, this requirement is even less in Kanpur because of the type of fabric being produced. Canvass and cotton-belt involve very little amount of skill.

The religion and caste composition of workers is shown in table 6.3.

*Table 6.3*: Religion & Caste Composition of workers (in %)

| | Handloom | | Powerloom | |
|---|---|---|---|---|
| | Weaver | Prep.Lab | Weaver | Prep.Lab |
| *Hindu* | *37* | *71* | *52* | *74* |
| Upper Caste | 0 | 0 | 1 | 13 |
| Middle Caste | 9 | 23 | 16 | 19 |
| Lower Caste | 32 | 48 | 35 | 42 |
| *Muslim* | *63* | *29* | *48* | *26* |
| Upper Caste | 0 | 0 | 0 | 0 |
| Middle Caste | 17 | 7 | 23 | 13 |
| Lower Caste | 46 | 22 | 25 | 13 |
| *Total* | *100* | *100* | *100* | *100* |

*Source: Field Survey*

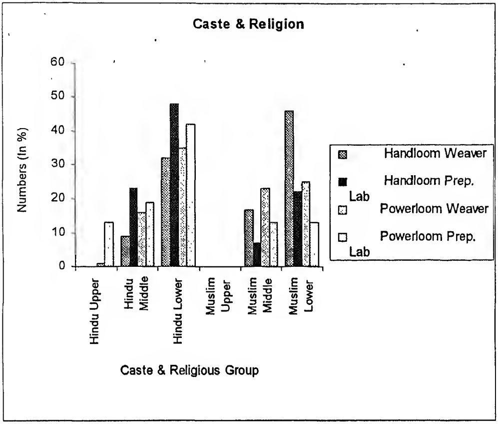



*Figure 6.4* It is obvious from above that Muslims are more in handloom weaving. Upper castes in both religions are simply absent. The figure of upper caste Hindus in preparatory labour is of supervisory type. Handloom and powerloom are basically a lower caste occupation. This was found to be true in case of proprietors and workers. The age structure of workers in informal textile industry of Kanpur shows many interesting trends. The age of weaver is generally higher than the age of preparatory labour in handloom as well as powerloom. However, weavers of handloom are much older than that of powerloom. Absence of young weavers in handloom shows that new generation is not coming into weaving profession at all, casting doubt on long run sustainability of handlooms in Kanpur. Lower average age in powerloom verifies our earlier contention that the set of skills required in powerloom weaving is different from handloom weaving.

Craftsmanship, which develops over a period of time through learning by doing, is no longer at premium in powerloom. Lower average age of preparatory labour is a result of unskilled or semi-skilled nature of preparatory work where any casual labour could join the labour market at any time. It is found that within the category of preparatory labour once again the average age is higher in those works where skill is required than that of purely manual works.

There is total absence of women workers in weaving in Kanpur. There is a saying that "*marad kare bunkari jab janana kare hathkari*" (men could do weaving only when women do preparatory work). Weaving as such is exclusively a male domain. Apparently women are engaged in preparatory work only. But a more careful examination revealed that many women are as dexterous in weaving as male. Had weaving been a prerogative of males only this would not have been like this. Further investigation revealed that women supplement the work effort of male weavers in weaving though no male weaver was ready to accept this. There are certain types of preparatory work, for example bobbin filling, where women outnumber men.

Workers are backward educationally. The highest education level reported is intermediate and primary for male and female workers respectively. In this respect no difference between handloom and powerloom is reported.

The proportion of migrant worker is found to be low in weaving and high in preparatory work in both sectors. While this percentage is 12% and 21% in weaving in handloom and powerloom respectively it is 38% and 67% in preparatory work in handloom and powerloom respectively. These migrant workers are mainly from adjoining districts like Fatehpur, Unnao, and Etawa. This over dependence on

migratory workers results in labour shortage in agricultural seasons when these workers go back to their native place to become engaged in agricultural operation.

The average earning per working day per skilled labour and per unskilled labour are Rs. 34.30 and Rs. 7.30 respectively in handloom and Rs.31.00 and Rs. 20.60 in powerloom.[6] But the range of variation is low in handloom and very high in powerloom. However, powerloom earnings are based on 8 hours of shift and handloom earnings are based on 12-15 hours of shift. So, while powerloom workers do manage to work more than one shift it is simply impossible for handloom workers. Coupled with higher number of working days it makes annual earnings of powerloom worker much more than handloom worker. Since powerloom production is more closely linked with larger market, the vagaries and fluctuations of market do influence powerloom production and consequently earnings of powerloom workers. These uncertainties are minimised in handloom production because it caters to local market. Consequently, though handloom earning is lower than powerloom earning it is more stable and secure than powerloom earning. Although piece rate payment is wide spread, in powerloom preparatory work time rate is used because of higher speed of production. Thus, while handloom preparatory labour works in many units on piece rate, powerloom preparatory worker works in a single unit on time rate. This explains the wide difference of earnings of preparatory workers between powerloom and handloom.

Piece-rate, as a method of wage payment, is considered to be superior to time-rate because it results in a higher per worker production and, at the same time,

[6] These estimates are based on payments made by a unit only.

reduction in per unit cost of output; and ensures a higher wage for the worker.[7] In different countries different piece-rate patterns are in vogue. The simplest form is the straight piecework system, wherein there is uniform wage rate per unit from the very first unit of output. On the other there are complex piece-rate systems based on differential payments for every additional unit of output above a fixed norm. These complex methods of piece-rates have resulted in increasing labour productivity and national income in the mature economies. That is why the International Labour Organisation,[8] the India Planning Commission[9] and the Labour Ministry have emphasised the extension of the principle of payment by results.[10] Almost the universal form of piece-rate prevalent in Kanpur is the straight piece-rate system, as a method of incentive for higher production (or may be a method of cost reduction!). While in handloom 97% of workers in weaving and 68% workers in preparatory work are paid on the basis of piece-rate, this figure stands 96% and 51% respectively in case of powerloom i.e. piece-rate is more prevalent in handloom than in powerloom and more widespread in weaving than in job-work.

A significant part of male work force is erstwhile mill workers, especially weavers. The percentage of erstwhile mill workers in our sample of weavers is 21% and 33% for handloom and powerloom respectively. The percentage for preparatory worker is 4% and 12% in handloom and powerloom respectively. It means that a larger proportion of erstwhile mill workers have gone into powerloom sector. It is

[7] For a detailed discussion, see Dobb, M.H., 'Methods of Wage Payment' in Singh, V.B. (Ed.) Industrial Labour in India, Bombay, 1963.
[8] I.L.O: Payment by Results, Studies and Reports, New Series, No. 27, Geneva, 1951.
[9] See for example, Second Five-year Plan, Chapter on 'Labour Policy', para 22.

[10] This system of wage payment has received tremendous boost with the onset of liberalisation and structural adjustment in India. While Indian private sector has already adopted this system in a big way, even public sector too is shifting to this. Its supposed superiority over time-rate is a matter of debate.

found that those who had worked in weaving departments of mills necessarily go into weaving along with some others who did not work in weaving departments of mills. These erstwhile mill weavers say that they do not know any thing else other than weaving. No female erstwhile mill worker is found in our sample.

It would make sense to observe the previous work experience of weavers and preparatory workers in our sample.

*Table 6.4*: Work Experience of Workers (in %)

| | Handloom | | Powerloom | |
|---|---|---|---|---|
| | Weaver | Prep. Lab | Weaver | Prep. Lab |
| A. In Mill Sector | 21 | 4 | 33 | 12 |
| Weaving | 19 | 1 | 30 | 3 |
| Other than Weaving | 2 | 3 | 3 | 9 |
| B. In Informal Sector Itself | | | | 0 |
| Weaving | 58 | 0 | 38 | 11 |
| 2-5 years | 7 | 0 | 4 | 1 |
| 5-15 years | 12 | 0 | 18 | 9 |
| 15-30 years | 16 | 0 | 13 | 1 |
| More than 30 years | 23 | 0 | 3 | 0 |
| Other than Weaving | 19 | 79 | 26 | 44 |
| 2-5 years | 5 | 19 | 9 | 17 |
| 5-15 years | 7 | 38 | 10 | 21 |
| 15-30 years | 4 | 19 | 7 | 5 |
| More than 30 years | 3 | 3 | 0 | 1 |
| C. In other Industry | 1 | 13 | 2 | 29 |

*Source: Field Survey*

The above table shows that weavers are drawn either from the stock of ex-mill workers or from the informal sector itself. At the same time preparatory work is used as a stage of learning of weaving whereby a worker graduates to weaving from preparatory work. The reverse process is absolutely absent in handloom and very weak in powerloom. Preparatory labour is drawn from other industries as well. Our contention that new generation workers are reluctant to join weaving in handloom is verified by above table.

Labour is universally temporary and there are no other payments like bonus and gratuity. No handloom or powerloom unit adheres to labour laws. It's a totally 'hire and fire' system. No worker was found who is regularly in work in one enterprise for more than two years. Working conditions are simply pathetic.

**6.2.2 Family Labour and Wage Labour**

As noted above the incidence of family labour is higher in handloom than in powerloom, the incidence being higher in manufacturing than in job-work in both sectors. Manufacturing in handloom is more family labour intensive than that of manufacturing in powerloom but the opposite is true in case of job-work. Higher incidence of family labour in handloom is a result of many socio-economic factors. Handloom is a technology of collectivity where group effort and individual creativity are required. But powerloom economises these variables reducing weaving to individual effort only. It is no longer possible to afford a certain degree of casualness associated with family labour in high speed and mechanised production. It may be argued whether marginal productivity of family labour is greater or less than wages or equal to zero or greater than or less than zero, but one thing is sure that the most of the family labour is disguised unemployment.

Family labour in itself is not a homogeneous category. It's a bundle of many categories of workers, some intensively working and some providing assistance to main workers. It was found in our sample that almost all members of family are somehow or the other involved in production in handloom unlike powerloom. A large part of family labour works as family labour only when wage employment is not forthcoming, i.e., family labour of today may be wage worker tomorrow. Only a small part of family labour works as family labour permanently. This temporality of status

is more pronounced in handloom than in powerloom. Higher volume of production ensures that some family members are permanently engaged in production in powerloom. Family labour enjoys a fair amount of security as well - unavailable to wage workers. While the first claim on job is of family labour, wage labour is used only when family labour is either unavailable or inadequate. Moreover, The working conditions of family labour and wage labour are different, while family labour is used in 'soft works' like- supervision, maintenance and sales, wage labour is employed in 'hard works' like- transportation and weaving. However, family labour is 'functionally flexible' and wage labour is 'numerically flexible', the former being a generalised and the latter being a specialised form of labour. Although there are casual wage labours also - not specialising in a particular work at all, but the majority of it has specialised either in preparatory work or in weaving.

There is *a priori* reason to believe that incidence of family labour is a determinant of profitability. Wide spread prevalence of joint family or extended family suggests that the cost of maintenance of family labour must be lower than the outlay on wage bill. Then only this type of family structure could have survived. Of course there could be sociological explanations too. When the value of family labour is imputed on the basis of market wage rate, most of the units turn out to be generating negative surplus; eating out of their fixed capital. It means that viability of units is crucially dependent on family labour. This dependence is greater in handloom than in powerloom. In absence of alternative employment opportunities elsewhere, production in informal textile industry of Kanpur may be viewed as a method of keeping family labour employed.

One of the principal sources of family labour is a woman of the household. Similarly the proportion of female wage labour is low in total wage labour. They may be called as invisible labour because of non-recognition of their work effort. Even in our field data the reported number of female family labour is much below the actual number. This has, largely, to do with the status of women in weaving community. Factors like, predominance of Muslim caste which is known for low status of women, lower education level and lower income may be cited as one of the reasons. Although there are evidences of women enjoying better position in textile weaving in other parts of country at different points of time (Banerjee and Mitter, 1998), we do not find any evidence like that either in present or in past in case of Kanpur. During the course of fieldwork it was observed that the involvement of female family workers is directly related with the size of the unit, i.e., in smaller units involvement of female family worker is greater than that of larger units. Here size seems to denote the income level of the proprietor. Although many children were found to do errand and assisting main workers, they were not considered as worker at all. In many cases the household of child could not afford to spare him to attend the school regularly.

The state of female wage labour is all the more terrible. Once again their number is considerably under-reported because of the fact that they are not regarded as labour as such being engaged in activities not directly related with production, like, cleaning, sewing, bobbin filling, dying and finishing of the fabric. It seems that there is some gender specific work in which women are preferred. The wages of these female workers are below their male counterparts.

## 6.3 Organisation of Production and Production Process

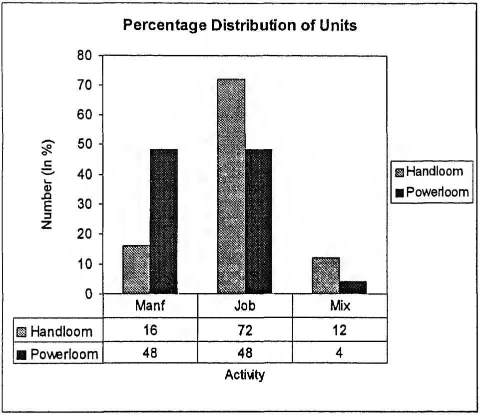
There are three types of production organisation in handloom and powerloom sectors. Firstly, there are many manufacturing units who buy raw materials and labour and sell their produce in the market. Secondly, there are some units doing job-work, which is a sort of contract between the buyer and the weaver. These units procure work orders from market and charge a predetermined conversion rate. This conversion rate depends upon the technical specification of fabric woven. The buyer provides the technical specification and the raw material. Thirdly, there are units doing manufacturing and job-work both depending upon the market condition. The percentage of units of this category is reported to be low in our sample.

In our sample the distribution of units according to these categories is as follows.

Table 6.5

| | Handloom | Powerloom |
|---|---|---|
| Manufacturing | 8 | 12 |
| Job-work | 36 | 12 |
| Mix | 6 | 1 |
| Total | 50 | 25 |

Handloom units are mostly engaged in job-work and manufacturing work constitutes only 16% of the total. In powerloom manufacturing and job-work, both are equally important. The causes of this phenomenon may be examined in later part. Sub-contracting is present in textile industry of Kanpur in various ways, though not always manifest. Sometimes one unit carries out only a part of the job order procured by some other unit. In this situation the unit which procured the order can be a manufacturing or a job-work unit, which in turn supplies the raw material and the product design to the second one. The relationship between the original and sub-contracted unit is found to be temporary and adhoc in nature and no case of long-term relation is reported in Kanpur.




In our sample of handloom sector 38% units are in sub-contracting arrangement while only 12% units are in sub-contracting arrangement in powerloom sector. This proves the precarious situation of handlooms and highlights the importance of intermediaries. There are units in handloom as well as in powerloom which are technically manufacturing units but in reality a sub-contracted unit. This means that in sub-contracting arrangements conversion rate is not always the basis of agreement. Often a mutually agreed upon price per unit is fixed and a sub-contracted

unit is supposed to supply the fix amount of the product to the parent unit on this rate and bear all expenses including raw material and labour.

Job-work in itself is a form of sub-contracting. In this case, a trader operating in whole sale market, (in Kanpur it is located in Generalganj) receives the order along with the product design and gets it done by job-working unit on a mutually agreed upon conversion rate. Often more than one intermediary is involved and weavers are at the bottom end of this arrangement which is either horizontal or vertical in nature. As such with the increase in number of intermediaries the profit margin narrows down and the adequacy of the conversion rate becomes more and more questionable.

The production process in informal textile sector of Kanpur is multi staged. In the preparatory stage, yarn (cone or hank) is purchased from the market or the special outlets run by the government, wrapped on beams and filled in bobbins. The longitudinal thread on beam is called warp and the latitudinal thread of bobbins passing through warp is called weft. Along with yarn count, the numbers of weft and warp yarn are the most crucial determinants of the quality of fabric. In this very stage the weaving design and the colour combination are decided. Preparatory works are segmented and highly labour-intensive involving substantial amount of family labour, especially the female labour. Of late homogeneity of product along with large market size has encouraged many enterprises to come up with capital-intensive techniques, resulting in to lowering of cost of preparatory work. These enterprises either procure job order for preparation of beams and bobbins or sell readymade beams and bobbins in local market at much lower prices. Naturally it is beneficial for the small weavers to buy rather than to prepare it. It means that there may be some sort of relationship

between increasing capital-intensity of preparatory work and observed homogeneity of output.

The second stage of fabric production is weaving. Weaving is performed in residential dwellings itself or in separate space called '*Karkhana*'.

The last stage is processing which is done either by processing houses, which are highly capital-intensive, or manually which is highly labour-intensive. Since in Kanpur and its neighbouring cities, there are no processing houses weavers have to either produce fabric which does not require processing at all or resort to manual processing, including dying of fabric, or transport their produce to far-off places like Pilakhuwa, Mau and Gorakhpur. The last option entails blocking of working capital for a long period of time. Since the most of the units are operating on a very narrow capital base, this option is practically not open to them. These units are thus forced to produce items like *Dari* and canvass which does not require processing at all. The predominance of *Dari* in handlooms and canvass in powerlooms in our sample may be explained in this light clearly.

Although these stages are common to handlooms and powerlooms, there are some variations too. Firstly, handlooms use hank yarn and powerlooms use cone yarn. Because of the imposition of excise duty on cone yarn its price is greater than the price of hank yarn. But the conversion cost of hank yarn into cone yarn is less than the price differential, resulting into diversion of hank yarn meant for handloom sector to powerloom sector. Secondly, unlike handlooms non-residential powerloom units are reported in our sample. Thirdly, handlooms are manually operated but powerlooms are electrically powered. It means that regular supply and cost of electricity become important variables in determining the commercial viability of powerlooms. Load-

shedding and line fault along with charging of commercial rates of power hampers the viability of powerlooms. Some powerloom units find it much beneficial to have illegal connections (called *Katiya*) by bribing concerned officials and install power generators. Our fieldwork data suggests that cost of power per meter of canvass increases from Rs 0.24 to Rs 2.27 when generators are used. This estimate is based on non-commercial tariff of power and running cost of generators. When profit margin is very narrow this amount is substantial. That is why only large firms are able to have this facility. Large firms manage this additional cost by larger volume of production and possibility of higher loss when production stops.

**6.3.1 Product**

There is a high degree of product specialisation in Kanpur. The product of handloom aims at either the lower income group or the higher income group. Since only the handlooms can perform complex weaving and intricate designing,[11] there is a demand for ethnic designs of complex weaving among urban elite. To ride on this ethnic wave demands a different set of production and marketing structure, which is generally absent in the most of the handloom units. As such, only some handloom units are able to thrive well by responding to such demands, especially after 1980s. Apart from specialised production of such highly value added items, the most common item of handloom production in Kanpur is Dari and Ja-namaz.

There are a few powerloom units in Kanpur, which produce dhoti, lungi and other shirting material. But, unlike other powerloom centres in U.P. like Mau, Khalilabad, Gorakhpur, and Mauaima and Merrut, powerlooms in Kanpur generally

produce canvass and cotton belts. There may be two reasons for this. Firstly, there is a local demand by army and ordinance factories. Secondly, there is no processing house in Kanpur and canvass, unlike other fabrics, does not need processing. Cloths other than canvass need processing. Processing involves a substantial amount of transportation cost and working capital. Two stages of cloth production- weaving and processing are clearly inter-linked in powerloom sector. Choice of sectoral capital-intensity becomes important here. Powerlooms will lose their competitive advantage vis-à-vis composite mills if processing cost increases. This is a classical case of adaptation of production structure to local conditions.

Indian textile industry has several star performers like Reliance, Arvind Mills, and Madura Coats. While these high performers are producing brand of high value like Park Avenue, Louise Phillip, Peter England, the mills of Kanpur are producing low value items like towel and bed sheets only. This is simply tragic. Once upon a time these mills had a big overseas market. Lal Imli and Elgin mill had a strong brand loyalty. But glorious history of these mills is now a thing of the past.

### 6.3.2 Specialisation

As seen above there is almost complete specialisation in handloom and powerloom sectors. Handloom and powerloom sectors have specialised in production of *Dari* and canvass respectively. This specialisation could be explained in terms of opportunities and constraints.

*Daris* have a stable market, least affected by market fluctuations. Moreover, there is a huge local market for *Daris*. Therefore, a handloom weaver is guaranteed of

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[11] A fair amount of complex weaving can be done by the powerlooms as well. But this entails setting up of more advanced attachments with powerloom. Moreover, capital cost increases significantly when these attachments are used with powerlooms.

market for his produce and can plan his production accordingly. The relative stability of price of Dari helps him in projecting output flow over a period of time. Though profit margin on *Dari* is low but it is assured. A handloom weaver prefers to have lower profit rather than taking the risk in striving for higher profits. Production of items like decorative pieces is fraught with risk, though profit margin is very high on these items. The one unit in our sample producing these items had made huge losses many a times coupled with huge profits at most of the times. This unit sailed through rough weather only because of strong working capital base, which it had. Unlike this unit, most of the handloom units have very narrow working capital base and thus could not afford to take any risk at all. The strong working capital base works not only as a cushion to absorb shocks but also as a facilitator in exploring profit opportunities. Fabrics could be processed from far off processing houses and could be sold in far off markets only when there is sufficient capital base to afford a lead-time[12] of at least two months. Wage cost in Dari is much lower than what it is in decorative items. A piece of *Dari* (5metres long and 1.5 metres wide) takes almost one weaver day but we came across a piece of decorative item (1metre long and 1 metre wide) which took thirty three weaver days! So there is many fold increase in labour cost and blocking of working capital for very substantial period of time. Once again working capital becomes important. And lastly the quality of yarn being supplied to handloom sector is not suitable for producing any thing other than *Dari*. Yarns of higher quality are available in market but their prices are disproportionately higher and thus uneconomical to use.

[12] Our estimate is that it takes at least two months to get products processed from processing houses situated in far off places, like Gorakhpur, Pilakhuwa and Mau. Similarly it takes more than two months to receive payment if the produce is sold in far off makets.

The reasons cited above explaining the observed specialisation in handloom sector hold on powerloom sector too. Apart from the above-mentioned reasons, one additional factor, explaining the observed specialisation of powerlooms in production of canvass, is technological limitations. The types of looms being used in Kanpur are most suitable for the production of canvass. Since these looms are semi-automatic and of older vintage, their width is low and there is frequent breakage of yarn. Canvass is a product of lower width and breakage of yarn does not affect the quality of canvass as much as it does in other items, like *Dhoti, Lungi*, shirting and *Saris*. Moreover, canvass does not require any processing at all. As said earlier, there are no processing houses in and around Kanpur. Therefore, canvass is the most suitable item to produce on powerloom in Kanpur. That is why there is almost complete specialisation in powerloom.

## 6.4 Market

### 6.4.1 Product Market

As said above, product market is buyer's market. There is a stiff competition among weavers (sellers) whereas traders (buyers) are cartelised. As such, it is the buyer who influences the price. This situation is reinforced by variety of reasons as outlined above. At one end these traders depress fabric prices and on the other hand yarn priced are inflated by them by not allowing intrusion of traders from outside into the local market. These traders have subverted the attempts made by the government to supply yarn at reasonable rate to weavers in various ways.

### 6.4.2 Factor Market

#### *6.4.2.1 Capital Market*

Capital market is highly imperfect and dualistic in nature. Generally scheduled commercial banks and regional rural banks are the formal source of credit, which charge below shadow rate of interest. This credit is of two types- (a) long-term credits for fixed capital and (b) short-term credit for working capital. Out of fifty handloom units surveyed only three units had availed themselves of long-term credit and none have ever received working capital credit from banks. But some of the powerloom units under survey have been able to receive long-term as well as short-term credit, though however a minor part of it, from such formal sources. Access of powerlooms to bank credit is still very low as compared to other business activities in Kanpur. To limit further lending, banks as non- performing assets often classify total outstanding debt to the informal textile sector. But a break down of bank's accumulated bad loan shows that a major part[13] of this is accounted for by large firms and share of medium or small firms is very low. Right now cheap source of credit (bank credit) is simply unavailable to informal textile sector of Kanpur.

Firms have to operate with low capital base and they have to resort to informal sources of credit because formal credit is not easily available to them. Unlike banks, private moneylenders are ready with liquid cash to fill in this vacuum without asking for any guarantee or collateral security and formal procedure which makes the process easy and quick. Lending is easy and quick. Generally fabric or yarn trader is himself a moneylender. There are three channels of private money lending. First is cash lending

[13] In some cases it is up to 90%-95%. Our estimate for Kanpur is that it is somewhere around 75%. Even one or two individuals have availed of credit repeatedly from several banks and this loan constitutes a significant part of total accumulated bad loans of banks.

which entails very high rate of interest, ranging from 2% monthly to 5% monthly[14]. Second is selling yarn on credit. In this form of lending, there may be either direct or indirect interest payment. The prices charged of yarn are higher than market prices. The differential depends on time taken for repayment. Third form of private money lending is tying credit with output. Moneylender finance raw material (mostly yarn) requirements with a condition that weaver shall sell his product to the moneylender. In this form exploitation is double edged- the weaver pays higher price for yarn and receives lower price for product.

*6.4.2.2 Labour Market*

Labour market is highly imperfect where the supply exceeds the demand for labour resulting in low wage rate, which is estimated here in Kanpur to be Rs. 30.00 per mandays on an average. This wage rate drives labourers in informal textile industry of Kanpur to absolute poverty and deprivation. Various factors like the overall decline of Kanpur as 'industrial city'[15], closure of textile mills, casualisation of labour, heavy influx of labour from outside, displacement of labour from organised sector etc. are responsible for this over supply of labour. Ironically labour is in short supply when it is harvesting or cropping time because they go back to their respective villages to become engaged in agricultural activities and in this sector wage rate is not high enough to discourage this tendency[16].

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[14] It is actually charged on week or fortnight basis. Here it has been adjusted for month.

[15] That is why labour from eastern U.P. and north Bihar is no longer migrating to Kanpur. In early 70s Kanpur used to attract labour from these areas. This is related with the drying up of employment opportunities in Kanpur. Most of labourers in informal textile sector of Kanpur are local residents or belong to neighbouring districts.

[16] This Harris-Todaro prescription is not applicable in Indian labour market. Had this model been applicable there would not have been so much of return migration of labour from Punjab where wage rate is on the higher side.

There are two types of labour- weaver (skilled labour) and preparatory (unskilled) labour. Wage rate of a weaver is higher than that of a preparatory labour. The former is paid in piece rate and the latter is paid in time rate[17]. Due to piece rate payment of wages a labourer bears the risk and uncertainty. It also sets a standard to measure individual performances. Piece rate links wages to quantity as well as quality of work done. Naturally a labour becomes a subject to the wishes of a loom owner. With no job security and social security system in place, the position of labour, particularly of a skilled labour, becomes precarious. If a skilled labour finds no employment in weaving he has nothing else to do. In a decaying industrial city like Kanpur alternative employment opportunities for skilled labour of manufacturing industry are regularly shrinking. Skilled labour of informal textile industry of Kanpur is not immune from this general deterioration of industrial structure.

The advantage of powerloom over handloom, as reflected in previous discussion, spills over to annual labour earning as well. Annual earning per hired labour (skilled and unskilled labour taken together) is higher in powerlooms than in handlooms. In both sectors, annual earning per hired labour is higher in manufacturing than in job-work. Generally annual earning per hired labour is the same in job-work whether the unit is in handloom sector or in powerloom sector. The advantage of job-work in powerloom over job-work in handloom does not translate in to higher labour earnings. There seems to be two explanations for earnings per hired skilled labour per day being higher in handlooms.

[17] This is not always true. Loom owner always tries to pay wages on piece rate. But there are tasks, which are not identifiable. In these cases time rate is used. Most of preparatory works are non-identifiable. But there are works like beam making which are identifiable. In these cases not time rate but piece rate is applicable.

1. Handloom wages are based on 12-15 hours of shift per working day, against 8 hours of shift in powerloom.
2. Higher wage for skilled labour in handloom is accompanied by uncertainties of finding a job. Lesser number of working days in handlooms (table 2) shows irregular and discontinuous production process. Against this in powerloom, especially powerloom manufacturing, production is a regular and continuous process. On the other hand annual earning per hired skilled labour in powerlooms, especially in manufacturing units, is higher because of regular and continuos production inspite of lower wages.

The labour pool, in itself, is continuously in a flux. The wage labour and loom owners alternate their position and as such a significant part of the labour pool of today is erstwhile loom owners. This is particularly true with handloom sector where a little amount of fixed capital is sufficient to start a unit. That is why there is a continuous attempt on the part of labourers to change their status from a casual labourer to a master although with little success. Though little but the filling of working capital coffer, which decides the fate of these attempts, is not that easy task.

Workstations of unorganised textile sector are not spacious and lighted nor ventilated. Working conditions are unhygienic. Accidents are common because of poor maintenance of machines and there is no compensation payment for loss of life or working ability. In handloom sector loss of sight and in powerloom sector hearing impairment are common.

**6.4.3 Fluctuations and Seasonality**

One interesting aspect of informal textile sector of Kanpur is that it is the weaver who bears the increment in yarn prices whatsoever. But it is the trader who reaps the

benefit of increase in fabric prices. Traders know market better than producers (weavers) do. When yarn prices are expected to go up in future[18] traders place order at current output prices. When yarn prices are expected to go down traders postpone their purchase and buy the fabric only at reduced yarn prices. Thus market fluctuations make weaver worse off and traders better off. Our field experience suggests that market fluctuation is the last thing weavers would like to have. On the contrary, they prefer to have stable market.. Apart from yarn prices, the fabric prices too have a tendency to witness wild fluctuations. Ironically, as said above the beneficiary is not weaver but trader. There is a linkage between fluctuations in yarn prices and fabric prices. Despite of claims of government, the supply of yarn to informal sector is not smooth and regular. When yarn prices go down weaver with low capital base, majority being like that either expands or starts production. Many of them were found to be waiting idle for yarn prices to go down. Therefore, declining yarn prices result into over-production of fabric and consequent fall in prices of output. Similarly increase in yarn prices contracts production. There are times, just before festivals like, Id, Holi and Depawali, when production expands oblivious of yarn prices, resulting into fall in fabric prices. But, as said above, in none of these situations the weaver reaps the benefit. It is ultimately the trader who makes money out of these fluctuations. Rather these fluctuations affect weavers very badly.

The fluctuations in production manifests into employment generation as well. There is considerable seasonality in supply of labour and demand for labour. Demand for labour expands in tandem with the expansion of output and *vice versa.* However,

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[18] Traders come to know it in advance and this information is not available to weavers. Even if weavers know, they have no alternative.

there seems to be some sort of gradation of labour. Family labour is at the top of hierarchy followed by wage labour. In terms of activity weaver is at the top followed by preparatory labour. In this gradation family weaver occupies the most coveted position and preparatory casual labour, especially female, is at the lowest rung of this hierarchical structure So, when the demand for labour expands its effect on different categories of labour is sequenced accordingly. Apart from output, many circumstantial factors too affect employment generation. One noticeable case of powerloom is worth citing. Employment generation in powerloom was found to be low in summer months in comparison to winter months. Our investigation revealed that power shortage is the principal reason for this. As said above, the first category of workers to be affected by fluctuations in employment generation is casual wage labour. The skill content of paid weavers makes them resilient to a certain degree to withstand these fluctuations. Thus all those forces generating fluctuations in production do so in case of employment generation too. However, there are fluctuations in employment generation even when production is stable. One such situation is a change in output itself. This change in output may be either production of a different product altogether or a change in technical specification of the same product. In either case labour absorption has to change accordingly. A unique level of labour absorption is associated with a particular product. Products may look alike apparently but there could be difference technically. In our study it was found that labour absorption in handloom varies in production of Dari and Ja-namaz and between canvass and cotton-belt in powerloom. Even in production of Dari there is difference in labour absorption between plain and coloured Dari. The same holds true for similar products in powerloom too. The amount of weaving work and preparatory

work as well as their proportion depends on products. Therefore, labour absorption and consequent fluctuations in employment is crucially dependent upon market forces, which determine what is to be produced.

This fluctuation in demand for labour in conjunction with supply of labour makes wage rate highly volatile. There are wide fluctuations in supply of labour too. It could be because of many reasons. In our study migration of labour to their native places in agricultural seasons and coming up of alternative employment opportunities elsewhere are two principal factors influencing supply of labour to informal textile industry of Kanpur. The supply of casual wage labour is more prone to fluctuations than that of weavers. This is reflected in their respective earnings as well. While wage rates of paid weaver in handloom and powerloom are in the range of Rs. 26-35 and Rs. 29-47 respectively these are in the range of Rs.11-40 and 13-40 in case of preparatory workers.

### 6.4.4 Risk and Uncertainty

One feel tempted to agree with the priest doing rounds in Faithfulganj, an area of powerloom concentration, when he says, "*mera aur mere jajman, dono ki akashvritti hai, jo mile gaya wahi bhagya hai* (my patrons and I are having a profession of sheer gamble, where whatever we get is only because of destiny)". A handloom weaver echoes the same sentiment when he equates profit in this business with '*Allah ka karam*'. These two quotes aptly demonstrate the degree of risk and uncertainty associated with handloom and powerloom in Kanpur.

The first and foremost factor of importance is fluctuations in yarn and fabric prices. Changes in either of the two bring misery to handloom and powerloom weavers. There could be one safety valve to turn this misery into an opportunity for

profit making. And this is proper sequencing (or timing) of sell and purchase decisions. This needs to be backed up by enough working capital, which is abysmally low in majority of units. Therefore, the risk factor operates through changes in prices of yarn as well as fabrics. In any case, the consequent loss is borne by the producer and the trader runs away with profit. Only those producers are able to claw away from the jaws of traders who have enough capital base.

In manual (as in handloom) or in semi-automatic (as in powerloom) technologies there could be neither standardisation nor guaranteed time flow of products. A small error at any stage of production could make the whole batch of output worthless. Since almost all operations are manually performed and are quite complex in nature, there is every possibility of something going wrong. Once this happens the producer is forced to sell the produce at throwaway prices and in case of job workers their job rate is compromised. There is nothing he could do other than gathering himself up to produce the next lot.

**6.4.5 Sales and Marketing**

Textile output reaches market through four different channels in the informal sector of Kanpur. Firstly, it may be sold directly to the final user of product. Secondly, it may be sold to traders either through their agents or directly. Thirdly, if unit is a job-work unit, output is handed over after charging conversion rate or predetermined price whatever the arrangement may be. Fourthly, in case of sub-contracted units, it is handed over to parent unit.

The remuneration received or the price charged by the weaver depends upon the type of arrangement. Price of output depends upon many a factor of which condition of product market and the quality of output are important. Product market is

a 'buyers market' where price is dictated by the traders of the wholesale market of Generalganj. Since the weaver's capacity to hold back their produce is limited due to the paucity of working capital, distress selling is rampant in handlooms and all the more common in powerlooms. Festivals like Id, Moharram and Bakarid are buying time for traders. This is the time when prices are at its lowest. The simple reason is that weavers have to sell their produce at any cost to meet the expenses of festivals. On the excuse of the quality of output, the traders or their agents try to depress the prices further.

Weavers have failed to cash on the higher prices offered by markets outside Kanpur. In our sample only 12% firms in handloom as well as in powerloom are able to sell their output outside Kanpur. Probably low capital base is the most important reason for this.

In their attempt to seek out markets outside Kanpur the best alternative could have been exports. Though general trend for the country is export orientation of handlooms, it is not so with Kanpur. It seems that lack of education and proper organisational structures are responsible for this. In our sample only one firm is reported to be able to export because of the individual drive of the concerned master-weaver. The attempts of the government through UPICA have failed because of multiple reasons. The first and foremost is rampant corruption and redtapism reported in UPICA. Secondly, the system of purchase and payment has forced handloom weavers to keep away.

To ensure proper marketing of handloom and powerloom products and to eliminate intermediaries, the government encouraged formation of co-operative societies. But these societies have failed to instil confidence in weavers. To usurp the

facilities provided by the government, big operators have used these societies in their own vested interests.

## 6.5 Technological Change

Technologically the whole of the informal textile industry of Kanpur is in backward state. Pit looms and semi-automatic looms are being used in handloom and powerloom sector respectively. There is absolutely no evidence of any major technological change. Pit looms and semi-automatic looms are the most primitive technology in textile sector. While newer technology in weaving in form of Air-jet and Sulzer looms have been introduced in informal sector of centres, like Mau, Merrut and Khalilabad, informal sector of Kanpur is still in primitive age. Out investigation revealed that most of the weavers are not aware of these technologies. Even if they are aware, they have no incentive to opt for these looms. The conclusion arrived at by Sen and Pack seems validated here. These weavers are unconsciously rational. It makes economic sense to choose backward technology rather than to go for modern capital-intensive technology.

Unlike modern capital-intensive technology, pit looms and semi-automatic looms offer a greater degree of flexibility, which is very valuable in fluctuating market environment. Pit looms and semi-automatic looms could be adjusted to produce a number of articles of different specification without incurring any substantial capital investment. Moreover, weavers could make necessary modification in design of loom to suit their individual requirement and comfort. For example height of the rope driving the bobbin in pit looms and height of the beam from surface and driving handles in semi-automatic powerloom are adjusted as per individual

suitability of weaver. But above all it is the high capital cost of modern looms *vis-à-vis* older looms that tilts the balance in favour of latter one.

## 6.6 Government Policy

Apart from the factor outlined above, the decline of handloom and rapid growth of powerloom are an unintended outcome of policy and reflective of failure of administrative machinery. It was rightly summarised by one handloom weaver when the Secretary, Textiles, U.P., went on an inspection visit of Sujatganj. He said, "instead of bringing us out of pit, you are throwing us in trench".

The policy of providing handloom weavers hank yarn at subsidised prices is largely a failure. No handloom weaver in our sample has availed of this facility in last one year. The yarn meant for handloom sector is diverted to powerloom sector. The cost of converting hank yarn into cone yarn is much lower than the price differential between the two. It was found that there are a number of enterprises doing this job only.

This is, largely, because of faulty structure of excise duty. The duty exemption, which is granted to hank yarn with the avowed objective of protecting handloom sector, is simply wastage of national resources. At the same time there is huge duty evasion by the powerloom sector. Thus, powerlooms are reaping the benefit of duty exemption on yarn and evading duty on fabrics. It is utter failure of tax administration. Ironically, except a few powerloom units, no unit could afford to bear any increment in cost in form of duty.

Most of the powerloom units are operating on such a narrow profit margin that it is not possible for them to bear additional cost of power in form of commercial rates of electricity. *Katiya* is a more safe, secure and guaranteed source of power than legal

power connection based on commercial rate of power. It, at least, ensures regular supply of power to powerlooms by protecting them from load shedding and line fault. All this is going on with the full connivance of concerned officials.

The conversion scheme adopted by the government earlier on had resulted into conversion of handlooms into powerlooms on paper only. Many handloom units do converted but there are cases where handlooms remained in operation. The conversion was carried on without establishing the support mechanism.

The government has established mammoth machinery to support handloom weavers in marketing of their produce. This machinery is nowhere visible in our field. There is absolutely no support in marketing of handloom products. The only machinery that could be seen to be present is U.P.I.C.A. But government would do better to close it down rather than running it and bearing the establishment cost. A handloom weaver has to run from pillar to post to receive payment from UPICA. It takes almost two months and that too after a legal deduction of five percent and an illegal deduction of five percent. That is why most of the handloom weavers have kept away from UPICA.

The government has created many institutions and machinery to support handloom and powerloom sectors. Handloom and powerloom training centres have been established to enhance the productivity of weavers. These centres have been partly successful. There are some cases where handloom and powerloom weavers have benefited from these centres. The institution of handloom and powerloom co-operatives is in existence to augment the capital base and to help in marketing of produce. It is observed that influential weavers in their own vested interests are using these co-operatives. The whole administrative structure that the government has

erected is simply ineffective and redundant. The callousness and apathy of the government machinery is so gigantic that all those departments and agencies dealing with handloom and powerloom were unaware of the approximate number of handlooms and powerloom in Kanpur. To top it all, none knew who is supposed to know.

*CHAPTER: SEVEN*

# TECHNOLOGY AND ITS INTERRELATIONSHIPS

## 7.1 Looms and Capital

Handlooms are quite primitive but highly flexible. Some minor modifications are made to suit production of a particular product or design. In weaving of designs some adjustment is made. While automatic looms are extensively used in organised mill sector, unorganised sector of Kanpur is still in semi-automatic age. Powerlooms are semi-automatic where bobbin carps need to be filled manually resulting into frequent breakage of yarn. This reduces quality of product. Most of these semi-automatic powerlooms are those discarded by mills of Kanpur in late 70s or early 80s and they have outlived their productive life as prescribed by their manufacturers. It is ingenuity of weavers of Kanpur that these second hand powerlooms are still working. Naturally maintenance cost is higher.

In handlooms number of looms in a unit varies from maximum of twenty-five to minimum of one. Average number of looms in manufacturing units is higher than job-work units in both sectors.

Costs of a semi-automatic second-hand powerloom and a handloom are on an average Rs 10000 and Rs 1000 respectively. Fixed capital includes plant & machinery as well as land and building. The cost of plant and machinery of powerloom is higher than handloom. A very large part of this difference is accounted for by higher cost of looms used in two sectors.

Table 7.1: Average value of important parameters

| | | Handloom | | | Powerloom | | |
|---|---|---|---|---|---|---|---|
| | | Manf | Job | Aggregate | Manf | Job | Aggregate |
| 1 | Number of Looms | 7.5 | 2.99 | 3.75 | 7.90 | 2.02 | 4.03 |
| 2 | Fix Capital | 78501 | 24805 | 30697 | 365622 | 80390 | 166294 |
| 3 | Cost of Plant & Machinery | 8209 | 1651 | 2457 | 106549 | 27142 | 54638 |
| 4 | Plant & Machinery / No. of Looms | 1089 | 553 | 655 | 13480 | 13438 | 13553 |
| 5 | Working Capital per Loom (in Rs)$_1$* | 5535 | 1283 | 1726 | 65991 | 1209 | 8772 |
| 6 | Working Capital per Loom (in Rs)$_2$* | 6065 | 674 | 1159 | 40422 | 2486 | 9490 |
| 7 | Working Days* | 244 | 224 | 230 | 279 | 224 | 252 |
| 8 | P&M/VA* | 0.06 | 0.04 | 0.05 | 0.08 | 0.74 | 0.27 |
| 9 | P&M/NE* | 893 | 467 | 558 | 4813 | 10254 | 7045 |
| 10 | EMO/VA* | 0.07 | 0.56 | 0.38 | 0.14 | 0.02 | 0.04 |
| 11 | FL/NL* | 0.22 | 0.40 | 0.36 | 0.11 | 0.46 | 0.23 |
| 12 | P&M/NL* | 686 | 275 | 352 | 4436 | 5689 | 5201 |
| 13 | Surplus/Loom | 12529 | 4978 | 6730 | 158812 | 11699 | 81974 |
| 14 | Rate of Surplus*(in %) | 820 | 919 | 890 | 1007 | 63 | 227 |
| 15 | VA/P&M* | 17.16 | 22.80 | 20.70 | 12.24 | 1.36 | 3.72 |
| 16 | VA/NL* | 11769 | 6282 | 7282 | 54282 | 7726 | 19372 |
| 17 | VA/NE* | 15043 | 10642 | 11558 | 58892 | 14373 | 29041 |
| 18 | VA/No. of Looms* | 18689 | 12606 | 13560 | 164961 | 18251 | 50475 |
| 19 | EMO/NE* | 7743 | 6012 | 6223 | 8132 | 6862 | 7290 |
| 20 | Earning per working day per skilled labour* | 42.9 | 33.6 | 34.3 | 30.3 | 35.1 | 31.0 |
| 21 | Earning per working day per unskilled labour* | 8.7 | 8.4 | 7.3 | 25.8 | 12.6 | 20.6 |
| 22 | Value Added/ Working Capital*$_1$ | 3.37 | 9.83 | 7.85 | 2.5 | 15.09 | 5.75 |

*Notes*: (a) * means geometric mean has been used.

(b) Two definitions of working capital are used.

1- means 1/6$^{th}$ of total material cost and wage cost

2- means total current assets

*Source: Field Survey*

There is difference between cost of plant and machinery of manufacturing and job-working units in handloom but in powerloom this cost per unit of loom is almost the same. This shows relative inflexibility of machines in powerloom sector. There may be reason to assume that production technique is continuous in handloom and discrete in powerlooms. The other part of fixed capital, i.e. land and building, does not present any variation between these two sectors. Barring some handloom units located in adjoining areas, most of the units are residential and located in densely populated 'Old City' area. Thus the value of land and building is inflated in general accounting framework giving an impression of higher capital requirement. Only a part of the fixed capital, namely plant and machinery is consumed in production process and as such only this should be taken as true measure of fixed capital.

The other part of capital i.e. working capital significantly influences critical policy decisions. Two alternative definitions of working capital have been used in this study. Firstly, working capital is defined as $1/6^{th}$ of total material cost and wage cost and secondly, working capital is defined as total current assets. However the first definition of working capital is based on the assumption of a time lag two months. The second definition measures working capital as it stand on the survey date. This assumption of time lag of two months is valid for manufacturing units. But in case of job working units it is less. In both definitions of working capital average working capital per loom is higher in powerlooms than in handlooms and manufacturing requires higher working capital than job-work.

One interesting aspect is that working capital is almost same in job-work units in handloom as well as in powerloom, as measured by first definition. Three explanations can be provided for this, viz.,

(a) Weavers have shifted from handloom to powerloom technique without augmenting their working capital. These newly shifted units, which are marginal firms, have no option but to do job-work only. Working capital intensity of powerloom is greater than handloom. Without higher working capital the commercial viability of units is always doubtful.

(b) The operation of market forces generally results in blocking of working capital of these marginal units since they lack bargaining power in the market.

(c) Job-work units of both sectors are facing similar type of market organisation and production process. Their working capital requirement is limited to meeting payment to hired labour along with some incidental charges. The proportion of hired labour and the wage rate being almost the same in both types of unit, this component is also same in job-work units of both sectors.

The limited working capital available is used more intensively in job-work units than in manufacturing units. Output generated by per unit of working capital (measured by Value Added/ Working Capital) is higher in job-work units than in manufacturing units.

## 7.2 Working Days

Conventional wisdom suggests that least cost production is possible only when machines are used round the clock and round the year. This proposition is based on the assumptions that machines are used only up till their productive age after which the maintenance cost becomes abnormally high and their scrap value is also negligible. In the informal textile sector of Kanpur almost all the looms presently in use, be it handloom or powerloom, have crossed their productive age long time ago and looms working within their productive age are rather an exception and

maintenance is not adequate.[1] It is obvious from our field data that units are not working throughout the year and throughout the day.

It can be observed from table 7.1 that on an average powerloom works for a higher number of days in a year than handloom and the latter shows wider variation in this respect than the former. In handloom, units are ranging from the maximum of 330 days in a year to the minimum of 150 days. The maximum value is 310 days and the minimum is 160 days in powerloom. It is also observed that-

(i) Manufacturing units in powerloom work for greater number of days than that of handloom.

(ii) Manufacturing units in both sectors on an average work for more number of days than job-work units.

(iii) Job-work units in both sectors work for equal number of days.

Lower number of working days in a year is a result of either supply bottleneck or demand constraint. Handlooms and powerlooms are not reported to be working throughout day. In handlooms only one shift of 10-15 hours is reported and probably availability of either sunlight or electric light is an important constraint for this. Whereas in powerlooms three working shifts, each consisting of 8 hours, are possible. In our sample one or two shifts extending up to 12 hours are also reported.

From above description it is clear that in the informal textile sector of Kanpur production is neither round the clock nor round the year. It may be because of either inefficiency in organisation of production or an adaptation to local conditions.

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[1] Its manufacturer determines life of a machine. Handlooms are locally made. So there is nothing like formal determination of its life or productive age. Powerlooms in Kanpur are generally second-hand and assembled. Obviously it becomes very difficult to determine life of powerloom. It seems that twenty-five years is a fairly reasonable estimate of life of handloom and powerloom.

From the neo-classical point of view lesser number of firms should have produced the same output by working for higher number of days. But it seems that survival goal rather than profit maximisation is guiding the behaviour of the firms. As regards the question of 'choice of technique', profit maximisation behaviour of firms is often debated by the neo-classical economists as the most significant underlying assumption. Even modern theorists too do not discard this assumption altogether. But from our study it is evident that when firms are being guided by survival goal paying of attention to profit maximisation and surplus generation is unfair to expect from them. Investment is no longer dictated by the logic of return when no alternative investment opportunity exists.

## 7.3 Factor-Intensity

The ultimate problem of 'choice of technique' is the selection of appropriate factor-intensity or technique out of various alternatives available. The neo-classical theory of continuous production function assumes spectrums of factor intensities where handloom and mill sector are two extremes denoting highly labour-intensive and highly capital-intensive techniques respectively. Powerloom is assumed to lie somewhere in between. Since labour-intensity and capital-intensity are two sides of a same coin, higher labour-intensity means lower capital-intensity and vice-versa. It is worthwhile to examine labour-intensity in our field data. There are three known indicators of labour-intensity. These are:

1. Capital-output ratio
2. Share of wage bill in output
3. Capital-labour ratio

Lower capital-output ratio, higher share of wages in output and lower capital-labour ratio reflect higher labour-intensity or lower capital-intensity.

Table 7.2

| | Handloom | | | | Powerloom | | | |
|---|---|---|---|---|---|---|---|---|
| PM/VA | Manf | Job | Mix | Total | Manf | Job | Mix | Total |
| <0.25 | 7 | 31 | 6 | 44 | 11 | 0 | 0 | 11 |
| 0.25-0.5 | 1 | 5 | 0 | 6 | 1 | 4 | 0 | 5 |
| 0.5 - 1.5 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 7 |
| 1.5 - 2.5 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |

*Source: Field Survey*

Table 7.3

| PM/VA | Handloom | | | | Powerloom | | | |
|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Total | Manf | Job | Mix | Total |
| Below mean | 6 | 20 | 4 | 30 | 12 | 4 | 0 | 16 |
| Above mean | 2 | 16 | 2 | 20 | 0 | 8 | 1 | 9 |

Capital-output ratio, which is defined in our study as ratio of plant and machinery to value added (P&M/VA), is higher in handlooms than in powerlooms. [2] Capital-output ratio of manufacturing and job work in handloom are very close to each other while there is a wide gap in this variable in manufacturing and job work in powerlooms. In powerloom manufacturing capital-output ratio is very low (nearing to handloom manufacturing) but in powerloom job work it is very high. Though manufacturing accounts for low capital-output ratio in both sectors, this trend is more

[2] When output is heterogeneous value added is used as a measure of output. As said earlier, fix capital as reported by handloom and powerloom is not a true measure of capital-intensity. So plant and machinery is used instead of fix capital.

pronounced in powerlooms. [3] In powerloom, all manufacturing units have capital-output ratio below average of powerloom sector but majority of job work units is above this. The same trend is observed in handlooms too, though not as strikingly clear as in powerlooms.

This definition of factor-intensity, in terms of capital-output ratio, suggests that handloom is labour-intensive and powerloom is capital-intensive. It also suggests that while capital-intensity is significantly higher in job work than in manufacturing in powerlooms, the difference between manufacturing and job work in respect of capital-intensity is insignificant in handlooms. Thus activity is (manufacturing or job work) is independent of capital-intensity in handlooms but there is some correlation between the two in powerlooms.

The second indicator of labour-intensity is the share of wages in output, which is defined in our study as EMO/VA. The share of wages in output is higher in handlooms than in powerlooms. While it is higher in job work than in manufacturing in handloom, it is higher in manufacturing than in job work in powerloom. This shows that handloom is labour-intensive than powerloom or powerloom is capital-intensive. It also shows that just opposite to handloom, job work is capital-intensive and manufacturing is labour-intensive in powerloom. But this indicator of factor-intensity is of very limited relevance in family labour intensive informal sectors like textile industry of Kanpur. So we may discard this measure altogether.

The third indicator of labour-intensity i.e. capital-labour ratio is defined in our study as ratio of plant and machinery to total number of hired labour (P&M/NE). It is

[3] In HL the mean and median of capital-output ratio (as defined above) is 0.10 and 0.09 respectively. In PL it is 0.54 and 0.34 respectively.

many times greater in powerlooms and higher in manufacturing than job work in handlooms and lower in manufacturing than job work in powerlooms. But this definition of factor-intensity (capital-labour ratio, defined as P&M/NE) does not present the complete picture. Like our second measure, this too is based on hired labour only and completely ignores family labour. As such in highly family labour intensive sectors instead of using only hired labour, total labour should be taken in to account. So we modify capital-output ratio from P&M/NE to P&M/NL. As a result the observed trend, where family labour was not included, still continues but only with a moderate difference.

Table 7.4

| | Handloom | | | | Powerloom | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PM/NL | Manf | Job | Mix | Total | | Manf | Job | Mix | Total |
| <400 | 0 | 15 | 0 | 15 | 2500-6000 | 11 | 6 | 0 | 17 |
| 400-800 | 6 | 11 | 6 | 23 | 6000-9500 | 1 | 5 | 0 | 6 |
| >800 | 2 | 10 | 0 | 12 | 9500-13000 | 0 | 1 | 1 | 2 |

*Source: Field Survey*

Table 7.5

| PM/NL | Handloom | | | | Powerloom | | | |
|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Total | Manf | Job | Mix | Total |
| Below Mean | 2 | 19 | 1 | 22 | 10 | 5 | 0 | 15 |
| Above Mean | 6 | 17 | 5 | 28 | 2 | 7 | 1 | 10 |

*Source: Field Survey*

Still handloom is labour-intensive and powerloom is capital-intensive. Moreover, manufacturing is capital-intensive than job work in handloom but job work

is capital-intensive than manufacturing in powerloom. In handlooms majority of manufacturing units are above average and majority of job-work units are below average capital-output ratio of handlooms. This trend is reversed in powerloom where majority of manufacturing units is below average and majority of job-work units is above average capital-output ratio of powerlooms.

To sum up, two important results may be derived from the above discussion viz.,

1. Capital-intensity was reported high in powerloom and low in handloom.
2. Manufacturing was reported to be capital-intensive in handloom and labour-intensive in powerloom vis-à-vis job-work.

These results emerged from aforesaid two measures of capital-intensity. Let us consider these results in greater details. Output per loom is higher in powerloom than in handloom and also higher in manufacturing than in job-work (Table 7.1). The same is true for fixed capital as well (Table 7.1). The proportionate increase in output is less than the proportionate increase in capital in shifting to powerloom from handloom, which is reflected in raising of capital-output ratio i.e. capital-intensity of powerloom is higher than that of handloom. Naturally capital-output ratio is higher in powerloom than in handloom. Going by this logic capital-output ratio should be higher in manufacturing than in job-work. This is true in handloom. But in powerloom, job-work does not adhere to this proposition and shows higher capital-output ratio (or capital-intensity) than manufacturing. Powerloom job-work units are characterised by lesser number of working days than powerloom manufacturing units (Table 7.1). It means that there is a significant under-utilisation of capacity in powerloom job-work. At the same time output is lower in powerloom job-work than in powerloom

manufacturing. This results into higher capital-output ratio (or capital-intensity) in powerloom job-work than powerloom manufacturing.

Capital-labour ratio is also higher in powerloom than in handloom. Moving from handloom to powerloom we find expansion of output, but the proportionate increase in capital is greater than the proportionate increase in labour absorption. This results into higher capital-labour ratio in powerloom than in handloom. Since labour absorption per loom is lower in powerloom job-work than in powerloom manufacturing the former shows higher capital-labour ratio (or capital-intensity) than the latter.

The analysis of factor-intensity shows that in the spectrum of capital-intensity handlooms are situated on the lower end and powerlooms are situated on the higher end. In between these two extremes there are overlapping areas. In fact this phenomenon of finding a spectrum rather than two distinct poles is evident everywhere in informal textile industry of Kanpur.

## 7.4 Factor Productivity

The choice of factor-intensity affects factor productivity as well. It is interesting to observe the behaviour of factor productivity in our sample. Increase in capital-intensity reduces capital productivity and increase labour productivity. Similarly increase in labour-intensity reduces labour productivity and increases capital productivity.[4] Capital productivity (output-capital ratio) in our data is defined as VA/P&M and labour productivity (output-labour ratio) is defined as VA/NE. NE means hired labour only. Family labour is not accounted for in NE.

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[4] It is assumed that there is no technical progress.

Capital productivity is higher in handloom than in powerloom. While capital productivity is lower in manufacturing than in job work in handloom, it is higher in manufacturing than in job work in powerloom. But the difference is wider in the former in comparison to the latter. Moreover, this pattern is not as obvious in handloom as it is in powerloom.

Table 7.6

| VA/PM | Handloom | | | | Powerloom | | | |
|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Total | Manf | Job | Mix | Total |
| Below Mean | 8 | 26 | 6 | 40 | 2 | 12 | 1 | 15 |
| Above Mean | 0 | 10 | 0 | 10 | 10 | 0 | 0 | 10 |

*Source: Field Survey*

Table 7.7

| VA/PM | Handloom | | | | Powerloom | | | |
|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Total | Manf | Job | Mix | Total |
| <10 | 2 | 16 | 2 | 20 | 2 | 12 | 1 | 15 |
| 10 - 20 | 2 | 10 | 1 | 13 | 8 | 0 | 0 | 8 |
| > 20 | 4 | 10 | 3 | 17 | 2 | 0 | 0 | 2 |

*Source: Field Survey*

The pattern of capital productivity, as shown in above tables, is in accordance with the 'marginalist analysis' where an inverse relationship is postulated between factor productivity and factor-intensity. This inverse relationship is embedded into the very definition of factor-intensity and factor productivity.[5]

The same argument suggests that higher capital productivity should be accompanied by lower labour productivity and vice versa. In other words, labour

[5] Capital intensity is defined by capital-output ratio and capital productivity is defined as output-capital ratio. The former is reciprocal of the latter.

productivity should be higher in capital-intensive techniques and lower in labour-intensive techniques. So labour productivity also needs detailed analysis.

Conventionally labour productivity is estimated by output divided by number of employees. But as mentioned earlier this definition of labour productivity excludes family labour altogether and as such needs to be modified by using total labour instead of hired labour (or the number of employees) only. In this study this measure is modified as VA/NL.[6]

It is observed that labour productivity is higher in powerlooms than in handlooms and in both sectors it is higher in manufacturing than in job work, though the difference is wider in the former than in the latter.

Table 7.8

| VA/NL | Handloom | | | | Powerloom | | | |
|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Total | Manf | Job | Mix | Total |
| Below Mean | 3 | 25 | 2 | 30 | 3 | 12 | 1 | 16 |
| Above Mean | 5 | 11 | 4 | 20 | 9 | 0 | 0 | 9 |

*Source: Field Survey*

Table 7.9

| VA/NL | Handloom | | | | VA/NL | Powerloom | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Tot | | Manf | Job | Mix | Total |
| <10000 | 3 | 26 | 2 | 31 | <50000 | 5 | 12 | 1 | 18 |
| 10000-20000 | 4 | 10 | 4 | 18 | 50000 - 100000 | 6 | 0 | 0 | 6 |
| >20000 | 1 | 0 | 0 | 1 | >100000 | 1 | 0 | 0 | 1 |

*Source: Field Survey*

[6] NL denotes total labour. The chapter on methodology provides the method of measurement of total labour and treatment of family labour.

Two important trends have emerged out from above tables. Firstly, labour productivity is higher in manufacturing units only in both sectors and secondly, most of the job-work units in handloom and all job-work units in powerloom show low labour productivity. This leads to the conclusion that achieving of high labour productivity is impossible in job work in both sectors.

The aforesaid analyses of factor-intensity and factor productivity are only the part of the larger problem of 'choice of technique', emphasise only the alternatives and ignore the output and the employment effects of various factor intensities. The basic theoretical construct of 'choice of technique' advances two propositions viz.,

(i) Capital-intensive techniques generate more output than labour-intensive techniques and labour-intensive techniques generate more employment than capital-intensive techniques. That is why the possibility of a conflict between output and employment is visualised.

(ii) The expansion in output is translated into higher and investment.

It has been observed in the earlier chapters that these propositions are not as simple as they look neither in theory nor in practice, because they are based on certain assumptions whose validity is questionable. Relaxing of these assumptions alters the conclusions drastically. Many empirical studies bear testimony to this fact. In our attempt to delineate all those factors, which influence the 'choice of technique' in real life, we need to examine these propositions. Since output is the onus, let us examine the output effect at the outset.

## 7.5 Output

Value added[7] per loom is higher in powerloom than in handloom. While it is almost one and half times greater in manufacturing than in job work in handloom, it is almost nine times greater in manufacturing than job work in powerloom.

Table 7.10

| | Handloom | | | | Powerloom | | | |
|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Total | Manf | Job | Mix | Total |
| Annual V.A. (in Rs) | | | | | | | | |
| < 50000 | 1 | 24 | 1 | 26 | 0 | 6 | 1 | 7 |
| 50000-100000 | 3 | 4 | 4 | 11 | 0 | 6 | 0 | 6 |
| >100000 | 4 | 8 | 1 | 13 | 12 | 0 | 0 | 12 |

*Source: Field Survey*

Table 7.11

| | Handloom | | | |
|---|---|---|---|---|
| | Manf | Job | Mix | Total |
| 1. VA per loom (in Rs) | | | | |
| <15000 | 2 | 22 | 2 | 26 |
| 15000-30000 | 5 | 4 | 4 | 13 |
| >30000 | 1 | 10 | 0 | 11 |
| 2.VA per loom per working day (in Rs) | | | | |
| <50 | 2 | 14 | 2 | 18 |
| 50-100 | 3 | 12 | 4 | 19 |
| >100 | 3 | 10 | 0 | 13 |

*Source: Field Survey*

[7] Since output is heterogeneous value added is used as a substitute for output. Its method of calculation is given in the chapter on methodology.

Table 7.12

| | Powerloom | | | |
|---|---|---|---|---|
| | Manf | Job | Mix | Total |
| 1. VA per loom (in Rs) | | | | |
| <100000 | 1 | 12 | 1 | 14 |
| 100000-200000 | 7 | 0 | 0 | 7 |
| >200000 | 4 | 0 | 0 | 4 |
| 2.VA per loom per working day (in Rs) | | | | |
| <400 | 2 | 12 | 1 | 15 |
| 400-800 | 6 | 0 | 0 | 6 |
| >800 | 4 | 0 | 0 | 4 |

*Source: Field Survey*

It is observed from tables above that output effect is stronger in powerloom than in handloom. While stronger output effect is crystal clear in manufacturing than that of job work in powerloom, it is not that sharp in handloom. But higher mean values of value added per loom in manufacturing than job work in handloom seems to support the contention that output effect is stronger in manufacturing than job work in handloom as well (table 7.1).

Two principal proposition of the theoretical model of 'choice of technique' are:

(i) Output effect is stronger in capital-intensive techniques in comparison to labour-intensive techniques; i.e. capital-intensive techniques are more output augmenting than labour-intensive techniques.

(ii) Employment effect is stronger in labour-intensive techniques than capital-intensive techniques; i.e. labour-intensive techniques are more employment generating than capital-intensive techniques.

To test the former proposition it becomes necessary to understand the precise relationship between output and factor intensity. In our study both the measures of factor-intensity, viz., capital-output and capital-labour ratio, are used.

Table 7.13: Handloom

| VA / loom | Capital-output (PM/VA) ratio | | | Capital-labour (PM/NL)ratio | | |
|---|---|---|---|---|---|---|
| | <0.25 | 0.25-0.5 | >0.5 | <400 | 400-800 | >800 |
| <15000 | 20 | 6 | 0 | 3 | 12 | 11 |
| 15000-30000 | 13 | 0 | 0 | 2 | 10 | 1 |
| >30000 | 11 | 0 | 0 | 10 | 1 | 0 |

*Source: Field Survey*

Table 7.14: Powerloom

| VA / loom | Capital-output (PM/VA) ratio | | | Capital-labour (PM/NL)ratio | | |
|---|---|---|---|---|---|---|
| | <0.25 | 0.25-0.5 | >0.5 | 2500-6000 | 6000-9500 | 9500-13000 |
| <100000 | 0 | 5 | 9 | 6 | 6 | 2 |
| 100000-200000 | 7 | 0 | 0 | 7 | 0 | 0 |
| >200000 | 4 | 0 | 0 | 4 | 0 | 0 |

*Source: Field Survey*

These tables show that higher capital-intensity (in both the measures) is essentially accompanied by low output and higher levels of output are achieved with low and medium level of capital-intensity. But this goes against conventional theory. The question of 'choice of technique' swings in favour of capital-intensive techniques on the ground that it is more output augmenting than labour-intensive techniques. In our sample it is not capital-intensive technique but labour-intensive technique, which has expansionary effect on output. Low capital-intensity is found to coexist with high level of output. Thus the conclusions emerged out of our study refute the conventional

theory that capital-intensive technique is more output augmenting than labour-intensive technique.

The latter proposition may be verified from our field study by correlating output and employment data. Output, as done earlier, is measured by VA/loom and employment or labour absorption by number of labour per loom. It may be observed that handloom is a labour-intensive and powerloom is a capital-intensive technique. Going by this proposition, higher output should result into higher labour absorption in handloom and higher output should not generate correspondingly higher labour absorption in powerloom.

Table 7.15

| HANDLOOM | | | | POWERLOOM | | | |
|---|---|---|---|---|---|---|---|
| VA/loom | No of labour per loom | | | | No of labour per loom | | |
| | <1.5 | 1.5-2.5 | >2.5 | | <1.5 | 1.5-2.5 | >2.5 |
| <15000 | 14 | 8 | 4 | <100000 | 1 | 5 | 8 |
| 15000-30000 | 5 | 3 | 5 | 100000-200000 | 0 | 1 | 6 |
| >30000 | 1 | 4 | 6 | >200000 | 0 | 0 | 4 |

*Source: Field Survey*

Though in our sample no clear-cut trend is evident, there seems to be likelihood of higher output being accompanied by higher labour absorption, but on the contrary lower output does not seem to be accompanied by lower labour absorption in handloom. Generally, number of labour per loom is comparatively higher in powerloom than handloom. In case of handloom no discernible relationship is found to exist between output and labour absorption. As such, the hypothetical relationship can neither accepted nor rejected.

The point of conjecture between output and employment in conventional theoretical model of 'choice of technique' is only one aspect of the problem. The other half of the problem is the possibility of a conflict between present output and future output through surplus generation. To ratify the point it is assumed that capital-intensive technique's higher output is translated into higher surplus and thus the growth potential of capital-intensive technique is greater than labour-intensive technique. In this study this means that higher output of powerloom is converted into higher surplus but the same is not true in handloom. Let us examine this proposition in our field study.

Table 7.16

| HANDLOOM | | | | POWERLOOM | | | |
|---|---|---|---|---|---|---|---|
| VA per loom | Surplus per loom | | | VA per loom | Surplus per loom | | |
| | <8000 | 8000-16000 | >16000 | | <100000 | 100000-200000 | >200000 |
| <15000 | 24 | 2 | 0 | <100000 | 14 | 0 | 0 |
| 15000-30000 | 0 | 10 | 3 | 100000-200000 | 1 | 6 | 0 |
| >30000 | 8 | 2 | 1 | >200000 | 0 | 0 | 4 |

*Source: Field Survey*

It is observed from above table that higher output essentially leads to higher surplus in powerloom but generates low surplus in handlooms, i.e. while powerloom follows the theoretical construct, handloom does not adhere to it. This is probably because of the fact that diseconomies of scale start accruing after a certain point in handloom. Higher range of output increase labour cost drastically, thereby reducing

the surplus per loom.[8] In this situation because of high wage rate increment in labour cost is disproportionately higher than increment in value added[9]. This may be observed in units located in adjoining rural areas.[10] So the reason for this high wage rate can be traced to local conditions, especially local labour market. This shows that it can not be assumed that techniques giving higher output results into higher surplus as well. It means that higher output may or may not give higher amount of surplus.

## 7.6 Surplus Generation

Since the question of surplus and in turn the growth potential is the pivotal point in the 'choice of technique' model, the concept of surplus needs greater elaboration in the context of informal sectors and in particular to our study. Marx introduced the concept of surplus as an analytical tool to explain the process of capitalist development.

The mainstream economists argue that surplus generation acts as one of the most important source of capital accumulation and consequently of economic growth in developing countries. The basic premises on which this postulation is based is that the surplus generated in the process of production is ploughed back in to production in the form of investment i.e. change in output leads to equal or nearly equal change in

[8] It is borne out by the fact that average value of labour cost in units with VA per loom of greater than or equal to 30000 and surplus per loom of less than 8000 is many times higher than units with other conditions.

[9] Share of wage bill in value added as measured by EMO/VA is abnormally high in these units. Average value for these units is 0.80 against aggregate handloom average of 0.14 and handloom job-work average of 0.56. These units are all job-work units. While average wage rate per man-day is on an average around Rs 32.0 in handloom, these units have wage rate in the range of Rs 40-47 per man-day.

[10] Out of eight units, four are located in one village (out of sample of five) and other four are located in other village (again out of sample of five).

investment. It is assumed that little or negligible part of this surplus goes into financing of consumption in developing countries.

Against this the Marxist economists have argued that in advanced capitalist economy this surplus is used in capital accumulation, both reinforcing each other at higher and higher levels and in consequence gradual pauperisation of labour. Not only is the value advance kept in circulation but it changes in its magnitude, adds a plus to itself, makes itself worth more, and it is this movement that transforms it into capital (Marx).

But the difference between an advanced capitalist economy and a backward economy like India lies not so much in any difference in the rates of surplus value as in the mode of utilisation of the surplus value. In an economy like India the bulk of this surplus value is used for luxury consumption by a thin stratum of the population and for unproductive investment in real estates, in speculation, etc. [Patnaik, 1987].

These two alternative views on surplus are formulated in the context of the organised manufacturing sector, where there is a tendency of centralisation of profit, technical change is rapid and rate of profit is high. In our study of informal textile industry of Kanpur, these concepts can not be implemented in toto. This sector is based on technology, which adheres to older social order where creativity of weaver in the form of dexterity and participation of larger social group in the process of production are still important. Weaving, be it handloom or powerloom, as an occupation is community based where instead of individual choice it is socially determined choice. It means that the stake is of the larger social group in surplus rather than that of individual claim. Naturally in these sectors, surplus becomes decentralised and widely spread-out. At the same time rate of surplus is low in

informal textile industry of Kanpur than that of any other organised sector. Rate of surplus is always lower in traditional industries and higher in emerging industries, as it is in information technology industry now.

Generally powerlooms have managed to generate surplus enough to become commercially viable by absorbing smaller technical changes in production conditions. One part of this small amount of surplus has gone into maintenance of or marginal increment in capital stock and the other part has positively affected the consumption of a thin stratum of population. But after all this small amount of surplus is so thinly spread-out that it seems to influence neither consumption nor investment in any significant way.

Handlooms have been unable to generate surplus enough to maintain even their capital stock at existing levels. Thus surplus has not induced consumption at all. That is why we find negative rate of surplus generation in a significant number if units in our study. Handloom weaving has been reduced to a method of keeping family labour employed. So the motive force is not surplus generation at all but to pull away anyhow. There is simply no other way out.

It is postulated that there is higher surplus generation in technique with stronger output effect. It means that surplus generation should be higher in powerloom than in handloom. Surplus per loom is higher in powerloom than in handloom (Table 7.1) i.e. capital-intensive technique is shown to generate higher amount of surplus than labour-intensive technique.

Investment depends on reinvestible surplus. Capital-intensive techniques are preferred on the ground that these techniques augment investment in the economy by

generating higher amount of surplus. Powerlooms are supposed to generate higher volume of surplus than handlooms.

Surplus per loom is greater in powerloom than in handloom. It is almost fifteen times higher in powerlooms. Surplus per loom is higher in manufacturing than in job-work in both sectors. But this difference is sharper in handlooms. This position is reversed when rate of surplus is observed. Rate of surplus is higher in handlooms than in powerloom. While rate of surplus in handloom manufacturing is lower than handloom job-work, in powerloom rate of surplus of manufacturing is more than fifteen times higher than job-work.

Table 7.17

| | HANDLOOM | | | | | POWERLOOM | | | |
|---|---|---|---|---|---|---|---|---|---|
| Surplus per loom (in Rs) | Activity | | | | | Activity | | | |
| | Manf | Job | Mix | Tot | | Manf | Job | Mix | Total |
| <8000 | 2 | 28 | 2 | 32 | <100000 | 2 | 12 | 1 | 15 |
| 8000-16000 | 3 | 8 | 3 | 14 | 100000-200000 | 6 | 0 | 0 | 6 |
| >16000 | 3 | 0 | 1 | 4 | >200000 | 4 | 0 | 0 | 4 |

*Source: Field Survey*

This may be explained by decomposing rate of surplus, which is a function of surplus per loom and capital cost per loom. Value of rate of surplus depends on the opposing forces of the two. Surplus per loom is lower in job-work than in manufacturing in handloom as well as in powerloom. It is strikingly clear in powerloom. Manufacturing accounts for higher surplus per loom than job-work in both sectors. It is proved from the following.

Table 19

| Surplus/loom (in Rs) | Handloom | | | | Powerloom | | | |
|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mixed | Total | Manf | Job | Mixed | Total |
| Below mean | 2 | 24 | 2 | 28 | 2 | 12 | 1 | 15 |
| Above mean | 6 | 12 | 4 | 22 | 10 | 0 | 0 | 10 |

*Source: Field Survey*

In the above table in handloom, mean = 6729.80. Similarly in powerloom, mean = 81973.82. It proves that, (a)-manufacturing activity is more surplus generating than job-work and (b)- powerloom generates higher surplus per loom than handloom. Although surplus per loom is higher in powerloom than in handloom, rate of surplus presents a different picture[11]. Mean value of rate of surplus along with mean values of surplus per loom and cost of plant and machinery is given below.

Table 7.19

| | Manf | Job | Aggregate |
|---|---|---|---|
| 1. Rate of surplus (%) | | | |
| Handloom | 820 | 919 | 890 |
| Powerloom | 1007 | 63 | 227 |
| 2. Surplus per loom (Rs) | | | |
| Handloom | 12529 | 4978 | 6730 |
| Powerloom | 158812 | 11699 | 81974 |
| 3. Cost of plant and machinery (Rs) | | | |
| Handloom | 8209 | 1651 | 2457 |
| Powerloom | 106549 | 27142 | 54638 |

*Source: Field Survey*

This table is self-explanatory. Rate of surplus depends positively on surplus per loom and negatively on cost of plant and machinery. The table explains very well why rate of surplus behaves in such a manner. It is now evident that surplus per loom

[11] Rate of surplus is defined as surplus divided by cost of plant and machinery.

and rate of surplus can not behave in the same manner. On the contrary there is every possibility of wild variation between the two. The behaviour of rate of surplus becomes a little bit more explicit from table below.

TABLE 7.20

| | HL | | | PL | | |
|---|---|---|---|---|---|---|
| Rate of surplus (%) | Manf. | Job | Mix | Manf. | Job | Mix |
| Negative | 0 | 3 | 0 | 0 | 0 | 0 |
| 0-200 | 2 | 7 | 0 | 1 | 12 | 1 |
| 200-600 | 0 | 10 | 2 | 1 | 0 | 0 |
| Above 600 | 6 | 16 | 4 | 10 | 0 | 0 |

*Source: Field Survey*

Rate of surplus, as given above, gives a profit-centred view of the situation. This surplus is not the reinvestible surplus. 'Choice of technique' debate swings in favour of capital-intensive technique on the ground that it is more surplus augmenting than labour-intensive technique where surplus is assumed to be reinvestible one. But surplus as defined above is not totally reinvestible because consumption of workers has not been deducted from it. The hypothesis that capital-intensive technique is more surplus (reinvestible) generating than labour-intensive technique and consequently growth stimulating- can be tested only when reinvestible surplus is used. But we do not have any measure of worker's own consumption, though it can be safely assumed that marginal propensity to consume of workers is unity i.e. total earning of labour is a floor limit of consumption. The imputed value of family labour may be used as a proxy of workers own consumption. Growth stimulating potential of a technique can be measured only when imputed value of family labour is deducted from surplus as arrived above[12]. This reinvestible surplus is given below.

[12] See chapter on methodology for details.

Table 7.21

| Reinvestible surplus per loom | HANDLOOM | | | | Reinvestible surplus per loom | POWERLOOM | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Total | | Manf | Job | Mix | Total |
| Negative | 0 | 19 | 1 | 20 | Negative | 0 | 7 | 1 | 8 |
| 0-8000 | 3 | 17 | 2 | 22 | 0-100000 | 4 | 5 | 0 | 9 |
| 8000-16000 | 4 | 0 | 3 | 7 | 100000-200000 | 5 | 0 | 0 | 5 |
| >16000 | 1 | 0 | 0 | 1 | >200000 | 3 | 0 | 0 | 3 |

*Source: Field Survey*

As mentioned earlier like surplus per loom, reinvestible surplus per loom also is higher in powerloom than in handloom. And here again reinvestible surplus per loom is higher in manufacturing than in job-work in both sectors.

But a meaningful comparison of handloom and powerloom can be done only by the rate of reinvestible surplus and not by reinvestible surplus per loom alone. Simple rate of surplus in a way is the rate of profit and profit is not only capital accumulation. Growth rate depends upon capital accumulation and the later is a function of reinvestible surplus. The growth potential of a technique can be measured by rate of reinvestible surplus. Let us see activity wise pattern of rate of reinvestible surplus in table 7.22.

Surprisingly 40% handloom units and 32% powerloom units are eating out of their fix capital. It may be interpreted as cost of keeping family labour employed, where employment opportunity elsewhere is very limited. This means that

productivity of family labour is below their consumption level, that is to say they are consuming more than what they are contributing[13].

Table 7.22

| Rate of reinvestible surplus (%) | HANDLOOM | | | | POWERLOOM | | | |
|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Total | Manf | Job | Mix | Total |
| Negative | 0 | 19 | 1 | 20 | 0 | 7 | 1 | 8 |
| 0-200 | 2 | 6 | 0 | 8 | 1 | 5 | 0 | 6 |
| 200-600 | 1 | 1 | 2 | 4 | 1 | 0 | 0 | 1 |
| >600 | 5 | 10 | 3 | 18 | 10 | 0 | 0 | 10 |

*Source: Field Survey*

It is also noteworthy that all negative reinvestible surplus units are job-work units. This proves our earlier contention that family labour is more widespread in job-work than in manufacturing. Out of 36 job-working units in handloom 19 units are having negative rate of reinvestible surplus. In powerloom out of 12 job-working units 7 units demonstrate negative surplus. This means that majority of job-working units are eating out of their fixed capital. This casts doubt on their long- term viability. This table also shows that manufacturing generates more reinvestible surplus than job-work. But handloom units are an exception to this where a good number of job-working units have high rate of reinvestible surplus.

The distribution of units across different groups of rate of reinvestible surplus is broadly the same in handloom and powerloom. The percentage of units below 200% and above 200% is equal in both sectors which suggests that in terms of rate of

[13] Consumption is defined as equal to total imputed value of family labour. It may be below or above this. Since imputed value of family labour is so low it can be assumed that consumption can not be below this and marginal propensity to consume is equal to unity.

reinvestible surplus there is no difference between a capital-intensive technique i.e. powerloom and a labour-intensive technique i.e. handloom. This goes against the proposition that favours capital-intensive technique on the ground that it generates higher reinvestible fund and by doing so it sacrifices present employment for future output.

Rate of reinvestible surplus is a positive function of reinvestible surplus and negative function of capital cost. Thus increment in labour productivity or in capital productivity will raise this only when the resultant productivity gain is larger than any possible increase in capital cost and vice-versa. Increment in capital-intensity will influence the rate of reinvestible surplus by increasing capital cost. Again this will depend on relative gain in productivity as compared to capital cost. We shall examine this in tables below.

The relationship in rate of reinvestible surplus and capital productivity is shown in table below.

Table 7.23

| Rate of reinvestible Surplus (%) | CAPITAL PRODUCTIVITY (VA/PM) | | | | | |
|---|---|---|---|---|---|---|
| | Handloom | | | Powerloom | | |
| | <10 | 10-20 | >20 | <10 | 10-20 | >20 |
| Negative | 15 | 5 | 0 | 8 | 0 | 0 |
| 0-200 | 4 | 4 | 0 | 6 | 0 | 0 |
| 200-600 | 1 | 3 | 0 | 1 | 0 | 0 |
| >600 | 0 | 1 | 17 | 0 | 8 | 2 |

*Source: Field Survey*

It is obvious that one of the reasons for negative rate of reinvestible surplus is lower capital productivity. Lower capital productivity has the effect of reducing the

rate of reinvestible surplus although it does not necessarily reduce it to negative level. There seems to be a direct relationship between capital productivity and rate of reinvestible surplus. But this relationship is stronger in handloom than in powerloom. Output expansion by increasing labour and keeping capital constant is possible in handloom. Consequently rate of reinvestible surplus increases with increment in capital productivity in handloom. But in powerloom output expansion beyond the particular limit where capital becomes fully utilised, is possible only with additional capital investment. This additional capital investment is bound to reduce capital productivity. That is why in powerloom higher capital productivity is not accompanied by higher rate of reinvestible surplus. But as we have already argued generally the behaviour of capital productivity is not independent of labour productivity.

Relationship between rate of reinvestible surplus and labour productivity is shown in table below.

Table 7.24

| Rate of reinvestible Surplus (%) | LABOUR PRODUCTIVITY (VA/NL) | | | | | |
|---|---|---|---|---|---|---|
| | Handloom | | | Powerloom | | |
| | <10000 | 10000-20000 | >20000 | <50000 | 50000-100000 | >100000 |
| Negative | 20 | 0 | 0 | 8 | 0 | 0 |
| 0-200 | 8 | 0 | 0 | 6 | 0 | 0 |
| 200-600 | 3 | 1 | 0 | 1 | 0 | 0 |
| >600 | 0 | 17 | 1 | 3 | 6 | 1 |

Labour productivity is higher in powerloom than in handloom. Here again, like capital productivity, we find that negative rate of reinvestible surplus is found in

low labour productivity class. This means that units with negative rate of reinvestible surplus are characterised by low labour productivity and low capital productivity. Again low labour productivity does not necessarily mean low rate of reinvestible surplus. It suggests a positive relationship between labour productivity and rate of reinvestible surplus.

Above discussion shows that labour or capital productivity positively affects the rate of reinvestible surplus. At the same time increase in capital cost negatively affects the rate of reinvestible surplus. It has been observed that capital productivity is lower in capital-intensive technique i.e. powerloom and higher in labour-intensive technique i.e. handloom and labour productivity is higher in capital-intensive technique i.e. powerloom and lower in labour-intensive technique i.e. handloom. While an increase in capital-intensity would reduce capital productivity and increase labour productivity, the net effect of productivity gain would influence the rate of reinvestible surplus. Thus it can not be safely said that increase in capital-intensity increases the rate of reinvestible surplus. As such it becomes necessary to examine the relation between two important measures of factor intensity viz., capital-output ratio and capital-labour ratio with rate of reinvestible surplus.

In handloom lower capital-output ratio is accompanied by either negative or higher rate of reinvestible surplus. In powerloom higher capital-output ratio is accompanied by negative surplus. Since generally higher capital-output ratio means lower rate of reinvestible surplus the notion that raising of capital-intensity increases reinvestible potential may be questioned. Thus it becomes necessary to test this proposition in reference to the other measure of capital-intensity i.e. capital-labour ratio.

Table 7.25

| Rate of reinvestible Surplus (%) | CAPITAL-OUTPUT RATIO (PM/VA) | | | | | |
|---|---|---|---|---|---|---|
| | Handloom | | Powerloom | | | |
| | <0.25 | 0.25-0.5 | <0.25 | 0.25-0.5 | 0.5-1.5 | 1.5-2.5 |
| Negative | 15 | 5 | 0 | 1 | 5 | 2 |
| 0-200 | 7 | 1 | 0 | 4 | 2 | 0 |
| 200-600 | 4 | 0 | 1 | 0 | 0 | 0 |
| >600 | 18 | 0 | 10 | 0 | 0 | 0 |

*Source: Field Survey*

Table 7.26

| Rate of reinvestible surplus | CAPITAL-LABOUR RATIO (PM/NL) | | | | | |
|---|---|---|---|---|---|---|
| | Handloom | | | Powerloom | | |
| | <400 | 400-800 | >800 | 2500-6000 | 6000-9500 | 9500-13000 |
| Negative | 5 | 8 | 7 | 6 | 1 | 1 |
| 0-200 | 0 | 4 | 4 | 0 | 5 | 1 |
| 200-600 | 0 | 4 | 0 | 1 | 0 | 0 |
| >600 | 10 | 7 | 1 | 10 | 0 | 0 |

*Source: Field Survey*

As is observed in the table above the same trend found earlier still continues. Higher capital-labour ratio means lower rate of reinvestible surplus where as low capital-labour ratio means negative rate of surplus. This discussion of factor proportions seems to validate the neo-classical proposition of production function where economic zone of production lies between upper and lower ridge lines.

All the measures of capital-intensity, capital-output ratio and capital-labour ratio indicate the possibility of rate of reinvestible surplus going down with increase in capital-intensity in our field data. This goes against the proposition that reinvestible surplus potential of capital-intensive technique is higher than the labour-intensive one.

So far we have tried to delineate the factors which determine the rate of reinvestible surplus. To conclude this discussion it is necessary to throw light on the relationships between important structural variables. Four structural variables, namely- capital-output ratio, capital-labour ratio, capital productivity and labour productivity have already been discussed earlier. But to draw any meaningful conclusion it is imperative to understand the behaviour of all these variables in relation to each other.

The following table shows the relationship between labour productivity and capital-labour ratio. It indicates that the highest concentration of units is in medium capital-labour ratio and low labour productivity in handloom while it is in low capital-labour ratio and low labour productivity in powerloom.

Table 7.27

| Handloom | | | | Powerloom | | | |
|---|---|---|---|---|---|---|---|
| Labour Productivity (VA/NL) | Capital- Labour ratio (PM/NL) | | | Labour Productivity (VA/NL) | Capital-Labour ratio (PM/NL) | | |
| | <400 | 400-800 | >800 | | 2500-6000 | 6000-9500 | 9500-13000 |
| <10000 | 5 | 15 | 11 | <50000 | 10 | 6 | 2 |
| 10000-20000 | 10 | 7 | 1 | 50000-100000 | 6 | 0 | 0 |
| >20000 | 0 | 1 | 0 | >100000 | 1 | 0 | 0 |

*Source: Field Survey*

High labour productivity is rare in both sectors. While in handloom labour productivity is almost uniformly distributed across all capital-labour ratio class, in powerloom medium and high capital-labour ratio is completely absent in high labour productivity class.

Table 7.28 shows the relationship between capital productivity and capital-labour ratio. Capital productivity is uniformly distributed across all capital-labour class in handloom, highest concentration being in low capital-labour ratio and high capital productivity class.

Table 7.28

| Capital PR (VA/PM) | Handloom | | | Powerloom | | |
|---|---|---|---|---|---|---|
| | Capital labour ratio (PM/NL) | | | Capital labour ratio (PM/NL) | | |
| | <400 | 400-800 | >800 | <2500-6000 | 6000-9500 | 9500-13000 |
| <10 | 2 | 9 | 9 | 7 | 6 | 2 |
| 10-20 | 3 | 7 | 3 | 8 | 0 | 0 |
| >20 | 10 | 7 | 0 | 2 | 0 | 0 |

The highest concentration of powerloom units is found in low capital-labour ratio and medium capital productivity class. Here again medium or high capital-labour ratio is completely absent in high capital productivity class.

From above analysis the proposition that in capital-intensive techniques labour productivity must be higher than in labour-intensive ones may be called into question. Similarly it also becomes doubtful that capital productivity is necessarily higher in labour-intensive techniques than in capital-intensive techniques. It means that while capital productivity is lower and labour productivity is higher in powerloom the reverse may be true in handloom.

Let us now examine the relationship between labour productivity and capital productivity. In handloom the highest concentration of units is in low capital productivity and low labour productivity class. Medium or high labour productivity is absent in low capital productivity class. At the same time low labour productivity is absent in high capital productivity class.

Table 7.29

| Capital productivity | Labour Productivity (VA / NL) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Handloom | | | | Powerloom | | | |
| VA/PM | <10000 | 10000-20000 | >20000 | Total | <50000 | 50000-100000 | >100000 | Total |
| <10 | 20 | 0 | 0 | 20 | 15 | 0 | 0 | 15 |
| 10-20 | 11 | 2 | 0 | 13 | 3 | 5 | 0 | 8 |
| >20 | 0 | 16 | 1 | 17 | 0 | 1 | 1 | 2 |

*Source: Field Survey*

In powerloom the highest concentration is in low labour productivity and low capital productivity class. Here again medium or high labour productivity is absent in low capital productivity class and low labour productivity is absent in high capital productivity class.

It is observed that low labour productivity is coexisting with low capital productivity. We do not find high labour productivity coexisting with low capital productivity or low labour productivity coexisting with high capital productivity. So it suggests that the inverse relationship between capital productivity and labour productivity which is established in conventional theory is not borne out by our field study.

Capital-output ratio measures productivity of capital as well as round aboutness of capital. When used as a measure of capital-intensity along with capital-labour ratio it is observed that capital-output and capital-labour ratios do not change in tandem. Of course the direction of change is same in both measures.

The highest concentration of units is in medium capital-labour ratio and low capital-output ratio class in handloom.

Table 7.30

| PM/VA | PM/NL | | | | | |
|---|---|---|---|---|---|---|
| | Handloom | | | Powerloom | | |
| | <400 | 400-800 | >800 | 2500-6000 | 6000-9500 | 9500-13000 |
| <0.25 | 13 | 23 | 8 | 11 | 0 | 0 |
| 0.25-0.50 | 2 | 0 | 4 | 1 | 4 | 0 |
| 0.5-1.5 | 0 | 0 | 0 | 4 | 2 | 1 |
| 1.5-2.5 | 0 | 0 | 0 | 1 | 0 | 1 |

In powerloom the highest concentration is in low capital-labour ratio and low capital-output ratio. Low capital-output ratio is absent in medium or high capital-labour ratio class. It is often argued that labour productivity increases and capital productivity decreases with an increase in capital-output ratio.

It is pertinent to examine the relationship between capital-intensity as defined by capital-output ratio and labour productivity in our study. In handloom the highest concentration is in low labour productivity and low capital-output class and high capital-output ratio is absent in medium and high labour productivity class.

Table 7.31

| Capital-Output ratio | Labour Productivity (V.A. / N.L.) | | | | | |
|---|---|---|---|---|---|---|
| | Handloom | | | Powerloom | | |
| PM/VA | <10000 | 10000-20000 | >20000 | <50000 | 50000-100000 | >100000 |
| <0.25 | 25 | 18 | 1 | 4 | 6 | 1 |
| 0.25-0.50 | 6 | 0 | 0 | 5 | 0 | 0 |
| 0.5-1.5 | 0 | 0 | 0 | 7 | 0 | 0 |
| 1.5-2.5 | 0 | 0 | 0 | 2 | 0 | 0 |

*Source: Field Survey*

In powerloom the highest concentration is in low capital-output and low labour productivity class. Here again medium or high labour productivity is absent in medium or high capital-output ratio class.

Even when capital-intensity is defined as capital-output ratio we do not find increase in labour productivity with an increase in capital-output ratio. Of course low labour productivity is found in high capital-output ratio.

In this context the relationship between capital-output ratio and capital productivity should be explored in greater detail. In handloom concentration of units is in high capital productivity and low capital-output ratio class. High capital-output ratio is present in low capital productivity class only.

Table 7.32

| Capital-Output ratio | Capital productivity (V.A. / P.M.) | | | | | |
|---|---|---|---|---|---|---|
| PM/VA | Handloom | | | Powerloom | | |
| | <10 | 10-20 | >20 | <10 | 10-20 | >20 |
| <0.25 | 14 | 13 | 17 | 1 | 8 | 2 |
| 0.25-0.50 | 6 | 0 | 0 | 5 | 0 | 0 |
| 0.50-1.50 | 0 | 0 | 0 | 7 | 0 | 0 |
| 1.50-2.50 | 0 | 0 | 0 | 2 | 0 | 0 |

In powerloom highest concentration of units is in low capital-output ratio and medium capital productivity class. Once again there is total absence of units in medium or high capital productivity and medium or high capital-output ratio class. Here it is found that there is a tendency of capital productivity going down with increment in capital-intensity as defined by capital-output ratio.

The above discussion of relationship between structural variables show that the type of relationship, as predicted by 'choice of technique' model, is generally non-

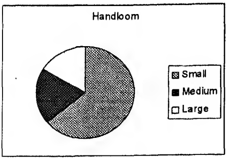
existent in our sample. It seems there are many exogenous variables, apart from the endogenous ones, which significantly affect this relationship and consequent choice.

## 7.7 Scale of Production

Choice of technique is nothing but choice of factor intensity and scale of production. It is assumed that large-scale production is capital-intensive and small-scale production is labour-intensive. Since powerloom is shown to be a capital-intensive technique and handloom is shown to be a labour-intensive technique it is assumed that powerloom is a large-scale and handloom is a small-scale technique. Many empirical studies have supported this hypothesis and as such theses hypotheses need empirical testing.

Technically the whole informal sector of textile industry is regarded as small-scale production industry. In this study whole informal sector is divided into consisting of small (less than five looms), medium (greater than five but less than ten looms) and large (equal to or greater than ten looms) units. The pattern of distribution of units according to activity is observed and compared between handloom and powerloom on the basis of average values of some important variables. The following trend is emerged.

**Share of small, medium and large units in both sectors**



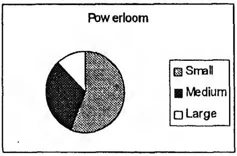




*Figure 7.1*

Table 7.33

| No. of looms working | HANDLOOM | | | | POWERLOOM | | | |
|---|---|---|---|---|---|---|---|---|
| | Manf | Job | Mix | Total | Manf | Job | Mix | Total |
| <5 | 3 | 27 | 2 | 32 | 2 | 12 | 0 | 14 |
| 5-10 | 0 | 7. | 3 | 10 | 7 | 0 | 1 | 8 |
| >10 | 5 | 2. | 1 | 8 | 3 | 0 | 0 | 3 |

*Source: Field Survey*

From our criteria of scale while manufacturing is present in all three sizes in both sectors, job-work is predominantly a small-scale production. This is all the more evident in powerloom.

Table 7.34 shows different ratios across all three sizes.

Table 7.34

| | HANDLOOM | | | POWERLOOM | | |
|---|---|---|---|---|---|---|
| | Small | Medium | Large | Small | Medium | Large |
| *VA per loom* | 14844 | 25382 | 13652 | 34663 | 172047 | 194949 |
| *Surplus/loom* | 6900 | 6583 | 5935 | 25940 | 150500 | 160727 |
| *Reinvestible Surplus/loom* | 370 | 3276 | 5468 | 15564 | 144230 | 156912 |
| *Labour/loom* | 2.11 | 2.10 | 1.40 | 2.67 | 2.94 | 2.61 |
| *P&M/loom* | 1008 | 522 | 960 | 14304 | 14236 | 11819 |
| *Working capital/loom* | 2020 | 3623 | 3825 | 4962 | 75865 | 100327 |
| *Capital-output ratio* | 0.11 | 0.05 | 0.10 | 0.73 | 0.38 | 0.07 |
| *Capital-labour ratio* | 552.64 | 350.20 | 684.88 | 5848 | 5406 | 4782 |
| *Capital productivity* | 56.82 | 319.21 | 13.63 | 2.50 | 12.95 | 16.31 |
| *Labour productivity* | 7523 | 11643 | 9756 | 13061 | 55455 | 76560 |
| *Family labour/ total labour* | 0.45 | 0.25 | 0.07 | 0.43 | 0.12 | 0.03 |
| *Working days* | 230 | 278 | 236 | 235 | 273 | 317 |

It is observed that the following conclusions emerge from above table.

1. Output increases with scale of production in powerloom but in handloom output is highest in medium size, but never in large size class.
2. Reinvestible surplus increases consistently with scale of production.
3. Labour absorption decreases with scale of production.
4. Capital cost is generally unchanged with variation in the scale with the exception of large powerloom units where it is found to be reduced.
5. Working capital increases with the scale of production.
6. Capital-output ratio generally increases with the scale of production in powerloom. But in handloom small and large units have same capital-output ratio, while medium size units have relatively lower capital-output ratio.
7. Capital-labour ratio decreases with scale in powerloom but in handloom lowest capital-labour ratio is found in medium size and highest value is found in large size class.
8. Capital productivity increases with scale in powerloom but in handloom highest value occurs in medium size and lowest value in large units.
9. Labour productivity behaves like capital productivity in handloom as well as powerloom.
10. The preponderance of family labour decreases with increase in scale of production.
11. Number of working days increases with scale in powerloom. But in handloom small units are characterised by lower working days and medium size units have higher working days.

These results verify many established propositions and refute some propositions of the theory of 'choice of technique'.

From above table the impression that profitability of large-scale units is higher than small-scale units may be gathered. But a conclusion about this can only be arrived at when a cost-benefit analysis of handloom and powerloom is carried out.

## 7.8 Cost - Benefit Analysis

Two techniques can be compared on the basis of private cost and private benefit. It can be a good measure to know the relative profitability of alternative techniques. It will show the 'switch-over rate of interest', the rate of interest at which it becomes profitable to switch over to other technique. To calculate this IRR, we need to know inputs required in producing value added of a fixed amount. In table below inputs required to produce value added of Rs 10000 is given.

Table 7.35: Inputs Required to Produce Value Added of Rs 10000

| | Handloom | Powerloom |
|---|---|---|
| 1. Man-days | 276.81 | 121.21 |
| 2. Fix Capital | | |
| a. Plant & Machinery | 549.07 | 3051.17 |
| b. Land & Building | 2387.27 | 10170.57 |
| 3. Working Capital | | |
| a. 1/6th of material cost plus wage cost | 1446.12 | 1974.76 |
| b. Current Assets | 970.95 | 2136.50 |
| 4. Total Capital | | |
| i. 2a + 2b + 3a | 4382.46 | 15196.5 |
| ii. 2a + 2b + 3b | 3907.29 | 15358.24 |

IRR is calculated on basis of the following alternative definitions of working capital and by excluding the cost of land and building which have no private value.

(a) First, working capital is assumed to be equal to two months operational cost.

(b) Secondly, it is assumed to be equal to current assets as reported by units.

It shows that handloom wage is Rs 32.40 and powerloom wage is Rs 33.24 per man-day. When is estimated on the assumed wage rate of Rs 50.00 per man-day, the following result emerges.

| | Internal Rate of Return (%) | |
|---|---|---|
| | Capital Cost (a) | Capital Cost (b) |
| Market Wage | 37 | 36 |
| Assumed Wage | 59 | 56 |

From the above statement it is obvious that at ruling market interest rate above 36-37 per cent would make handloom more profitable than powerloom. Moreover, alternative definition of working capital marginally influences the IRR.

Rate of interest on formal credit in Kanpur is around 15% but in informal market this rate of interest was reported to be between 24% to 36%. In the light of the fact that only powerlooms have access to formal credit, this result explains the continued expansion of powerloom and gradual decimation of handloom.

When social benefit and social cost are to be calculated, some value to fixed capital in handloom must be ascribed. Similarly, unlike powerloom, where market wage is reflective of shadow wages, in handloom this can be hypothesised to be either above shadow wage or equal to shadow wage depending on the state of labour market. In calculation of total capital required to produce V.A. of Rs 10000 in HL, the following six definitions of total capital are used.

(i) P&M + 50% of L&B + $1/6^{th}$ of material and wage cost

(ii) P&M + 50% of L&B + Current assets

(iii) P&M + 66.6% of L&B + $1/6^{th}$ of material and wage cost

(iv) P&M + 66.6% of L&B + Current assets

(v) P&M + 75% of L&B + 1/6th of material and wage cost

(vi) P&M + 75% of L&B + Current assets

Alternatively three shadow wages *ut infra* in HL can be identified[14].

(a) Shadow wage as 50% of market wage

(b) Shadow wage as 66.6% of market wage

(c) Shadow wage as 75% of market wage.

After the necessary modifications in private cost and benefit, the social cost and benefit can be arrived at. The 'switch over' rate of interest with above values are as follows.

Table 37

| Capital cost | Shadow Wages | | |
|---|---|---|---|
| | (a) | (b) | (c) |
| (i) | 58 | 52 | 50 |
| (ii) | 55 | 50 | 47 |
| (iii) | 60 | 54 | 51 |
| (iv) | 57 | 51 | 49 |
| (v) | 61 | 55 | 52 |
| (vi) | 58 | 52 | 49 |

In calculation of social cost and social benefit, with six alternative definitions of capital and three definitions of wages in handloom, the IRR varies. The range of variation may be summed up as:

Handloom wages as 50% of market wage = 55% - 61%

Handloom wages as 66.6% of market wage = 50% - 55%

Handloom wages as 75% of market wage = 47% - 52%

[14] This is based on the assumption that handloom shadow wages are lower than handloom market wages. Of course this assumption is questionable. Market wage level is so low that it is very difficult to validate this assumption. Mazumdar's (1984) analysis is based on this assumption.

Increment in shadow wages reduces the 'switchover' rate of interest, whereas increment in capital cost raises the IRR. This analysis highlights the importance of factor market distortion in affecting the 'choice of technique'. The conventional theory postulates that low interest rate and high wage rate are responsible for expansion of capital-intensive technique and decimation of labour-intensive technique. Handlooms become socially profitable only when market rate of interest is at least above 47%. Even if it is assumed that shadow wage is equal to market wage, in calculation of social cost and social benefit the 'switchover' rate of interest is in the range of 45%. Handloom is a preferred technique only when the rate of interest is above this limit. This factor market distortion, especially capital market, seems to have tremendous effect on the 'choice of technique'.

*CHAPTER: EIGHT*

# CONCLUSION

In earlier chapters we have attempted to address some questions which were raised in the introduction. Based on these questions and their subsequent analysis, we conclude our discussion on broadly three aspects, namely, the main features of Indian textile industry, the question of 'choice of technique' in context of Kanpur and the policy options.

[I]

Class interest of British mill owners and British rulers served each other (coupled with some historical accidents) to such an extent that Indian mill expanded rapidly and consolidated its foundation in pre-independence period. Of course in this period handicraft and handloom suffered a setback. After independence Nehruvian model of economic planning took its toll. The earlier bias in favour of large mills was done away with the avowed objective of social justice and equality. Apart from the shift in state policy many other changes in domestic economy further influenced textile industry. In the decade of nineties with the onset of globalisation and liberalisation the state policy is once again changing which is amply reflected in the Industrial Policy 1991 and its subsequent modifications and the Textile Policies of 1985 and 2000.

Growth of per capita availability of woven fabrics in quantitative terms has stagnated since mid-1960s in the domestic market. The stagnation of economic growth had affected per capita consumption of fabric and consumer preferences have

shifted to man-made fibre and blended cloth. As a result, although growth of per capita consumption of fabrics in quantitative terms has stagnated, per capita consumption of fabrics in value terms has risen. The production of synthetic fibre and yarns has increased dramatically but domestic prices of polyester filament yarn and staple fibre were much higher than international prices in the mid-1980s. Subsequently the price gap has begun to close due to decrease in price of domestic raw material, reduction of custom duty and excise duty and expansion of production capacity by Indian producers. Although consumer preference is shifting from cotton to man-made fibre and blended fabrics, there is still a room for growth of consumption of cotton fabrics because of higher increase in private final consumption expenditure.

Cloth production by the mill sector showed a steep fall because of competition from powerloom with their cheap labour and low fixed capital cost per unit of output. The powerloom workers work for extremely long hours for low wages under poor conditions because labour legislation is not possible to implement in the majority of powerloom units. It is the rapid growth of the powerlooms that is a characteristic feature of the development of the Indian textile industry.

As the consequence of state interventions at least five manifest features of Indian textile sector can be traced.

1. The co-existence of a very broad spectrum of production techniques.
2. The distinct trend towards decentralised, small-scale manufacturing in the unorganised or informal sector.
3. The sustained predominance of cotton as the primary raw material.
4. The existence of a large public sector.

5. A very high degree of domestic orientation of the industry.

As we have seen, each of the three production techniques are carving out a niche for themselves with a certain degree of specialisation in output, to coexist in Indian textile industry. The rapid growth of powerlooms and dwindling number of mills has promoted informalisation of production in industry and consequently major part of production is being achieved in informal sector outside the purview and regulation of government. As a consequence of this dual structure, labour is getting casualised preventing skill improvement of labour, which is indispensable for quality improvement of products and technological innovation. Even when blended fabrics are being used, cotton is still the primary raw material. The policy of nationalisation of sick mills has resulted into emergence of large public sector in Indian textile industry, which is either very inefficient or in a state of permanent sickness. The Indian industry has over-capacity in both spinning and weaving sectors leading to under-utilisation of capacity and thus has become a reason of structural sickness in the mill sector. The mill sector of Indian textile industry is characterised by binary structure. A large number of mills are either in loss or nominal profit making state, while a minuscule number of mills are making huge profits. The latter types of mills are those producing premium range of cloth of very low price elasticity. The whole of Indian textile industry is technologically backward with no incentive for modernisation and technical change. As we have seen, this technological backwardness finds its rationality in the structure of domestic economy itself.

It is outlined earlier that there is some rough specialisation by count groups, which partly explains the co-existence of the three technologies viz., handloom, powerloom and mill. Although handloom produces a sizeable proportion of very fine

cloth, they are traditionally specialised in coarse one (using 10s count of yarn or less). Generally speaking, mills have contributed most of the output in the medium varieties of cloth (using 11-30s count yarn). Though the recent trend in the mill industry is to "go finer"; it fails to overtake the powerloom in cotton fabrics using higher than 30s count of yarn. It is shown that mills have been producing more closely woven cloth to differentiate their products from the output of powerlooms.

Another factor, which helps to explain the co-existence of the three sectors, is segmentation in the factor market. The wage differential between the decentralised and the mill sector is very large. Given relative factor productivities, this wage gap gave the powerloom sector a strong advantage over the other two sectors. The cost-benefit analysis showed that powerlooms provided the most profitable technology over a wide range of interest rates. Of course the role played by excise duty in tilting the balance in favour of powerloom is also adequately proved. This conclusion is consistent with the observed growth of the three sectors- the powerloom taking the lead by a large margin. Further, the large-scale mill sector has probably better access to formal capital market in which interest rates are low, while both handlooms and powerlooms have to depend on localised capital markets with significantly higher interest rates. Thus segmentation in the capital market may provide us part of the explanation of the co-existence.

It is a clear enough that the policy of protection of small-scale in the textile industry has been responsible for substantial cost to the economy. Contrary to the intended policy of protecting the handloom sector, the bundle of policies adopted has so far encouraged a spectacular growth of the powerloom industry. The shadow wages, which should be used to assess social profitability, would almost certainly be

below the market wages in both the mills and the handlooms and consequently from the social welfare point of view the range of interest rates within which powerlooms are profitable would be narrowed down significantly.

[II]

The theoretical model of the 'choice of technique' argues that in a restrictive and static framework capital-intensive technique is growth augmenting and labour-intensive technique is employment generating and therefore, while the former maximises future output the latter maximises present output. Thus, a situation of conflict between output and employment and between present output and future output comes to the fore. As we have seen, this theoretical position is based on many restrictive assumptions and excludes many exogenous variables having influence on determination of 'choice of technique'. The present study of Kanpur tries to understand how exactly the choice is made in practice.

The 'choice of technique' of production is a choice of product as well. The neo-classical proposition that identical products could be obtained by techniques of varying factor proportion does not hold well in practice. Change in factor intensity results into change in product too and therefore co-existence of techniques with varying factor intensity lead to specialisation. Handlooms and powerlooms have specialised in production of *dari* and canvass respectively in Kanpur by carving out their own niche in market. This pattern of specialisation, which is largely an unintended outcome of policy, is evident in whole Indian textile industry as well. Techniques of varying factor intensity, viz., mill, powerloom and handloom have

specialised in three different types of fabrics. For a long time powerlooms were considered as natural development of handlooms and naturally, the policy remained oblivious of implications of expansion of powerloom.

Variation in factor intensity entails variation in organisation of production. Production organisation based on old social order of labour abundance and capital scarcity could not continue in capital abundance stage. Job-work, which is supposed to be the least profitable form of production organisation, is found in 72 per cent units in handlooms and 48 per cent units in powerlooms while percentage of manufacturing units is very low in handlooms and equal to job-work in powerlooms in Kanpur. It thereby suggests that higher capital-intensity of technique is conducive for manufacturing and not conducive for job-work. While manufacturing is a profit driven organisation of production, job-work is a disguised form of selling of labour power. Thus manufacturing is able to generate surplus, which does result into increasing capital-intensity of technique. Moreover, the capital cost involved in capital-intensive technique could be recovered only when there is sufficient surplus, both reinforcing each other. Higher capital-intensity generates higher surplus and higher surplus leads to subsequent capital accumulation and increment in capital-intensity. Thus the question of 'choice of technique' is intricately related with the mode of organisation of production.

Final output is to go through various stages of production; so factor intensity of technique at one stage of production is not independent of factor intensity at other stages, i.e., sectoral capital-intensities are not independent. The three stages of fabric production- preparatory work, weaving and processing are apparently independent but they are intimately related with each other in determination of 'choice of technique'.

Increment in capital-intensity at one stage of production pushes up capital-intensity at other stages also. Since weaving is the most important stage, the diffusion of higher capital-intensity follows from weaving to preparatory work and processing. Our fieldwork shows that absence of electrically powered independent processing houses, which are highly capital-intensive, has contributed a great deal in arresting the increment in capital-intensity in Kanpur. Although no reliable data on this aspect of Indian textile industry is available but our experience of other textile centers with independent processing houses, like Mau, Khalilabad and Gorakhpur testifies this linkage. Moreover, capital-intensity of weaving is not independent of capital-intensity of textile machinery sector, i.e., factor intensity of consumer goods and capital goods are interrelated.

The theoretical model of 'choice of technique' is based on assumption of perfect product market and factor market. It has been observed how imperfections in product market and factor market impinge on 'choice of technique'. Product market in Kanpur, being largely a buyer's market, is very imperfect and fragmented, where buyer are not consumers of fabric but wholesale traders. Sellers (weavers) have no bargaining power and these buyers (traders) dictate price. The manifest behaviour of supply outstripping demand holds true for Kanpur as well as for Indian textile industry. The major part of Indian textile industry is price elastic allowing little possibility of technical change. It is only in small price inelastic segment of market where major technological change is taking place.

Similarly factor market too is dualistic and imperfect in nature in Kanpur. This dualism is obvious in capital market where formal and informal sources of credit, former with low interest rate than that of the latter, are co-existing. While large firms

have access to formal sources of credit, small and marginal firms have to take recourse to informal credit. Interestingly the fabric and yarn traders provide a major part of this informal credit. Hence the supply of an important input of production, i.e., yarn becomes an instrument of exploitation of weavers by the traders. Since the trader of yarn is also a trader of fabric, the exploitation becomes double edged- the weaver pays higher price for yarn and receives lower price for product. There is considerable seasonality in labour market. Generally supply of labour exceeds the demand for labour when agricultural activity is in its peak. But there are times when labour is in short supply. Labour is of two types- weaver and preparatory labour; the former is paid in piece-rate and the latter in time-rate. Annual earning of hired labour is higher in powerloom than in handloom. It is observed that the state of labour market which decides wage rate, wage structure and wage differential along with capital market is very important in deciding the 'choice of technique'.

Cost-benefit analysis of handloom, powerloom and mill shows that there is considerable distortion in capital market, else powerloom production would not have been commercially profitable than handloom. It is pulling down of interest rate, which makes capital-intensive techniques more profitable than labour-intensive technique. Hence it may be concluded that optimum technique can not be chosen in distorted factor markets.

As argued by Pack and Sen, this study shows that second-hand looms are better suited to production conditions in Kanpur or in other words economic rationality demands selection of second-hand machines. It is also shown that working round the clock and round the year does not always make economic sense. Had modern automatic looms been commercially profitable there would not have been

collective myopia on the part of the whole informal sector of Indian textile industry. Non-adoption of these highly capital-intensive looms is based on the logic of economic rationality. Certainly non-working of machines round the clock and round the year means under-utilisation of capacity and entails some hidden cost, but it makes economic sense to bear this cost.

It is found that powerloom and handloom are capital-intensive and labour-intensive techniques respectively, no matter whether factor intensity is defined as capital-output ratio or capital-labour ratio. Moreover, manufacturing is reported capital-intensive in handloom but labour-intensive in powerloom. This goes against conventional wisdom. There is an inverse relationship between capital-intensity and capital productivity, i.e., capital productivity is higher in handloom than in powerloom and while it is lower in manufacturing than in job-work in handloom, it is higher in manufacturing than in job-work in powerloom. Again this labour productivity is higher in powerloom than in handloom and in both sectors it is higher in manufacturing than in job-work. Our analysis shows that it is impossible to achieve higher labour productivity either in handloom or in powerloom.

In discussion of 'choice of technique' it is assumed that output effect and consequently growth effect of capital-intensive technique is greater than that of labour-intensive technique. The present study shows that output effect is stronger in powerloom than in handloom and in manufacturing than in job-work. The argument that increment in capital-intensity raises the output level also is not borne out; on the other hand, high level of capital-intensity is accompanied by low level of output and low capital-intensity co-exists with high level of output. But no clear-cut relationship is found between output and labour absorption, though there seems to be likelihood of

higher output being accompanied by higher labour absorption. The growth potential of a technique is a function of the reinvestible surplus generated by the technique. The supposed superiority of capital-intensive technique is based on the assumption that capital-intensive techniques generate higher reinvestible surplus than the labour-intensive techniques do.

In this study of Kanpur, the question of surplus is examined in great detail. Surplus per loom is higher in powerloom than in handloom and higher in manufacturing than in job-work in both sectors. But rate of surplus is higher in handloom than in powerloom. And while it is lower in manufacturing than job-work in handloom, the situation is reversed in case of powerloom. This is because value of rate of surplus depends on two opposing forces of surplus per loom and capital cost per loom. It is not surplus as such but the reinvestible surplus, which determines the growth potential of a technique. It is observed that the results obtained for surplus per loom hold true for reinvestible surplus per loom as well.

Calculation of rate of reinvestible surplus shows that a large number of handlooms and powerloom units are eating out of their fixed capital. It may be interpreted as cost of keeping family labour employed, which means that family labour is consuming more than what it is contributing. As expected, eating away of fixed capital is more widespread in job-work than in manufacturing. Surprisingly, there is no difference between capital-intensive technique, i.e., powerloom and labour-intensive technique, i.e., handloom in respect of rate of reinvestible surplus. Hence it refutes the proposition that capital-intensive techniques are more growth stimulating than labour-intensive techniques. Our analysis of relationship between factor intensity and rate of reinvestible surplus shows that neither an increase nor a

decrease in capital-intensity increases the rate of reinvestible surplus. It seems that economic zone of production lies between upper and lower ridgelines.

This study shows that the proposition that in capital-intensive techniques labour productivity must be higher than in labour-intensive ones may be called into question. Similarly, it also becomes doubtful that capital productivity should necessarily be higher in labour-intensive techniques than in capital-intensive techniques. While capital productivity is lower and labour productivity is higher in powerloom, the reverse may also be true in handloom. The supposed inverse relationship between capital productivity and labour productivity is not borne out by our field study. Although both capital-output and capital-labour ratios measure capital-intensity of production, it is found that they do not change in tandem. Of course the direction of change is the same in both measures. Increase in labour productivity is not found with an increase in capital-output ratio but there is a tendency of capital productivity going down with an increment in capital-output ratio.

Generally it is assumed that capital-intensive and labour-intensive techniques are found in large-scale and small-scale production respectively. In our criteria of scale, which is based on number of looms working, no difference is found between handloom and powerloom but job-work is predominantly a small-scale production organisation. Apart from this many other results have come out from our analysis of scale, like- increases of output with scale of production in powerloom, increase of reinvestible surplus and working capital but decrease in labour absorption and incidence of family labour with scale of production.

[III]

This state of Indian textile industry is an outcome of interaction between domestic economic structure and economic policy. The vast expanse of this industry makes it only partly guided by the policy. The policy itself needs to be looked at within a paradigm of conflicts rather than one of rational choice among different alternatives. The problems of policy choice in the textile sector are compounded because of the multiplicity of objectives involved, the high degree of interrelation between various issues, and the large area of conflict between different interest groups. Given the liberal democratic framework it is inevitable that policies will be required to pursue multiple and often conflicting objectives. Rational policy making may be viewed essentially as an exercise in optimising trade-offs between conflicting goals.

In reality, the feasible set of policy options before policy-makers is considerably limited on account of various factors. Firstly, any programme of policy reform has to contend with the fact that policy choices are largely circumscribed by the historical evolution of the policies themselves and the sectoral structure that they have spawned. The operation of policies creates a class of beneficiaries with strong interest in their perpetuation. Thus major policy shifts from the *status quo* are often likely to encounter stiff resistance. Secondly, policies to be politically acceptable must maintain the visible equity level already achieved i.e., the employment implications of the policy choices have to be borne in mind. Finally policy choices have to invariably reckon with the tight budgetary constraints within which the government has to function. It means that in large part of the policy arena the approach has to be 'incrementalist', particularly in areas of high degree of conflict of interest. But much

of the 'incrementalism' that has characterised Indian textile policy has often promoted neither efficiency nor equity. In other areas where the policy *status quo* has proved too costly and injurious to the health of the system as a whole, incrementalism offers a poor guide to policy formulation. Here major policy shifts are simply unavoidable and 'rational' rather than an 'incremental' policy choice is needed. It implies, in a paradigm of conflict, that if the costs of compensating those adversely affected by such policy shift are less than the costs to the economy of continuing with the *status quo*, then the policy reform must be undertaken. In sum, a workable policy approach would necessarily have to involve a prudent mix of both the 'incremental' and the 'rational choice' paradigms.

Against this backdrop, we examine some important issues in textile policy. The first and foremost policy issue is the question of inter-sectoral competition. In terms of economic efficiency mill production of cotton cloth was probably superior to powerloom production. This important conclusion serves to underscore the fact that the manifest policy bias against the mills has had little social justification, though the 1985 textile policy did away with that and envisaged equal fiscal treatment of mills and powerlooms. But actual incidence of duty continues to afford an advantage to powerlooms on account of duty evasion, which is a primary factor responsible for dominance of decentralised sector in the production of finer cotton cloth. What is required is imposition of duty on yarn rather than on fabrics, so that the duty is shared in proportion to the amount of yarn consumed by respective sector. Although the shifting of duty in this way could lead to increased working capital requirement of spinning mills, but this would be more than offset by better yields and 'efficiency' gains resulting from an equality of fiscal treatment of mills and powerloom sector.

This equalisation of incidence of duty will place mill-powerloom competition on a more rational footing, at least in the production of cotton and blended cloth (using spun yarns). Of course in the production of pure non-cotton cloth woven primarily from filament yarn, powerloom would continue to have an edge. On the whole, these measures would enable the sectors to specialise on the basis of their genuine comparative advantage, instead of artificial policy induced cost-differentials.

As an employment generating activity, handloom weaving compares favourably with other rural development programmes. Further on account of their deep roots in culture, tradition and history, the promotion of handlooms has an abiding political and emotional appeal. The promotion of handloom must remain an important plank of any realistic textile policy. Official policy on handlooms can be classified into two separate categories, namely, promotional and regulatory. While there is considerable scope for improvement in the design and implementation of the promotional measures, the regulatory policies are much more controversial. The 1985 textile policy marked a departure from past, where it emphasises more on promotion rather than on regulation. But there are still certain regulatory measures, which are quite controversial.

The provision of reservation of certain articles for exclusive production by handlooms has remained, in effect, a dead letter. Despite an official restriction on the setting up of powerloom units they are springing up freely and it is almost impossible to prevent such units from producing certain varieties of cloth. If the intention is to ensure that certain articles are mainly produced on handlooms because it is felt that the latter have comparative advantage (or rather, the least comparative disadvantage) in their production, this objective could be better served by direct subsidisation of

these articles to make them cheaper to the consumer than similar powerloom produced items. It at least obviates the necessity of maintaining huge enforcement machinery.

The stipulation that not less than 50 per cent of all civil deliveries (market supply) of spun yarn be in hank form is based on the heroic assumption that the handloom sector will be able to maintain a constant share of decentralised production of cloth that is produced from spun yarn. Given the manifest technological superiority of the powerlooms, this is clearly unrealistic. It should hardly come as surprise that not withstanding the legal stipulation; the share of hank yarn in total market deliveries has been steadily declining. This policy of hank yarn obligation has been a major impediment to greater product specialisation by spinning mills and the economies attendant to this have been foregone. Finally, the packing of yarn in hank form entails a cost, in terms of the reeling facilities and the wages of the labour required for the same. These additional costs get incorporated in the price at which hank yarn is sold in the market resulting into almost equalisation of prices between hank and cone yarn- the excise duty advantage being neutralised by the additional cost of producing hank yarn. The objective of supplying yarn to the handloom sector could have been better served by establishing independent hank reeling centres at close proximity to handloom concentrations. The operation of these centres could be wholly or partly subsidised, so that the price of hank yarn becomes lower than the price of cone yarn. The delinking of hank reeling with yarn production could possibly take care of the alleged diversion of hank yarn for powerloom production. Since hank yarn continues to be exempted from duty, it is possible that with the recent fiscal changes, the tax advantage for hank yarn may have become large enough to make reconversion a

profitable proposition. This will obviate the necessity of any duty exemption for hank yarn, since all cotton yarn will initially be sold in cone form. The price of hank yarn may be fixed by the government at levels appropriately lower than the correspondingly cone yarn prices, so that while weavers are afforded some relief, at the same time, little incentive for reconversion. The losses on this account, as well as the cost of running these reeling centres could be met from the increased excise revenue resulting from the removal of the duty exemption for hank yarn.

The design and implementation of promotional measures have suffered by information gap concerning handlooms. The IRMA (1989) study is a path breaking one in this respect. Based on this study some comments may be made on promotional measures. A subsidy-oriented approach makes very little sense in respect of the high-earning weavers. The latter produce high value added items for the affluent segments of the urban market, which face no competitive threat. whatsoever from the powerlooms. State intervention should aim at providing such weavers with marketing and design assistance and help in technological improvement, which significantly increases productivity. The requirements of the medium earning weavers, who account for more than half of the total number of the weavers, mainly relate to skill upgradation, improved marketing support and better access to raw material and credit. They also need some degree of subsidisation so that their products remain competitive. The policy approach toward the poorest and the least skilled workers will necessarily have to be heavily subsidy oriented. The focus here will have to be on skill upgradation, subsidised supply of inputs, as well as subsidised marketing through state channels. In the context of improving the lot of the lowest earning weavers the Janata Cloth Scheme has the greatest relevance.

The problem of 'sickness' in mill sector is largely the result of over-capacity. Capacity creation has been a one way street with uneconomic units not being legally permitted to be weeded out. Viewed from a macrosystem perspective interventions such as nationalisation, take-over of management by the government and subsidisation of the production, do nothing to redress the imbalance between the demand for textiles and the capacity in existence for producing them. They merely transfer the competitive stress from the state assisted mills to other marginal units, which do not have the benefit of such support. Thus the pressing need is of an exit policy which redresses the genuine human problem of retrenchment of labour. Many of these mills are located on prime urban land, the sale of which could make the restructuring virtually self-financing. To ensure political feasibility and long term health of the textile system even a generous outlay towards labour compensation makes sound economic sense. The softer options have simply failed and there is no alternative to a well conceived exit policy.

Lack of modernisation is often billed as the most important reason of the backwardness of the Indian textile industry, where modernisation is defined in terms of degree of automation and age of machinery. This premise itself is somewhat mistaken since the age of the equipment is often a poor indicator of its performance, whereas greater automation does not, *ipso facto*, promise improved economic performance, if the relative factor prices dictate otherwise. Secondly, lack of modernisation may be an effect of sickness rather than a cause of it. For a large segment of the mills producing for the mass market greater automation is not a financially attractive proposition. It is possible to argue that from the point of view of society such automation is even less desirable. Ironically, despite the overriding

concern of the policy with preserving employment, it has actually encouraged the substitution of labour by capital in the organised sector through the device of cheap loans. To a large extent such loans have merely offset the high domestic prices of sophisticated machinery which is, apart from many other factors, a result of irrational excise duties and high tariff rates. Policy needs to focus on reduction of prices of domestic machinery rather than making it up with cheap loans. Further, there seems little rationale for a policy, which encourages automation in production for the domestic market. If at all soft loans are to be given to mills for this purpose, they should be available mainly for non-labour displacing modernisation. Capital cost of such changes will be considerably smaller than the costs involved in inducting the latest technology. Modernisation policy will necessarily have to be selective and directed towards areas where it brings the maximum returns to the economy as a whole.

# Appendix

## Schedule - I

| Block A | Identification Particulars |
|---|---|

1. Name of the Unit

2. Address

   2.1 Postal Address

   2.2 Telephone

   2.3 Name of Proprietor

---

3. Type of legal organisation

   3.1 Individual proprietorship

   3.2 Partnership joint family

   3.3 Partnership others

   3.4 Public limited company

   3.5 Private limited company

   3.6 Cooperative society

   3.7 Others

---

4. Nature of Industrial activity

   4.1 Manufacturing

   4.2 Job work

---

5. Year and month of establishment

---

6. No. of shifts normally worked

---

7. Other particulars :-

   7.3 Whether registered under facteries etc. — Yes/No

   7.4 Is there any form of sub-contracting — Yes/No

If yes, name the parent/
sub-contracted unit

7.5 Any branch of head office Yes/No

| Block B | Working days & shifts |
|---|---|

1. No. of manufacturing days
2. Total No. of working days
3. No. of shifts
4. Length of shifts (in hours 0.0)

| Block C | Assets & Liabilities |
|---|---|

Assets

1. Fixed Assets

   1.1 Land (at cost)

   1.2 Buildings (at cost)

   1.3 Plant & machinary (at cost)

   Less - Depreciation

   Total fixed Assets ______________________

2. Investment

3. Current Assets

   3.1 Inventories
   (at current market value)

   3.2 Finished product

   3.3 Work in progress

3.4 Raw materials and
other supplies

3.5 Accounts receivables

3.6 Deposits

3.7 Advances to employees

3.8 Other receivables

3.9 Cash in Hand

3.10 Cash in Bank

Total current Assets ____________________

Liablities

1. Shareholders fund

   1.1 Capital issued & subscribed

   1.2 Total Reserve

2. Fixed liabilities

   2.1 Loans from F.I.

   2.2 Debentures

3. Current liabilities

   3.1 Bank overdraft

   3.2 Trade account payable

   3.3 Other accounts payable

   3.4 Provision for taxation

   3.5 Provision for accrued expenses

   3.6 Interest due on fixed liabilities
   (still conpaid)

   Total liabilities ____________________

Block D Cost of production

| | | Rate | Total |
|---|---|---|---|
| 1. | Labour cost | | |
| | 1.1 Wages/Salary | | |
| | 1.2 Bonus | | |
| | 1.3 P.F. & other funds | | |
| | 1.4 Welfare expenses | | |
| 2. | Rent | | |
| | 2.1 Rent of land on lease | | |
| | 2.2 Rent for building | | |
| | 2.3 Rent for plant & machinary & other fixed Assets | | |
| 3. | Interest | | |
| 4. | Fuel & electricity consumed | | |
| 5. | Repair & maintenance | | |
| 6. | Freight & transport | | |
| 7. | Taxes (excluding Income Tax) | | |
| 8. | Postage & Telephone | | |
| 9. | Insurance Charges | | |
| 10. | Banking Charges | | |
| 11. | Printing & Stationary | | |
| 12. | Materials consumed during the year | | |

| Block E | Matcrials Consumed during the year | |
|---|---|---|
| | | Value (Rs.) |
| 1. | Basic material. | |
| 2. | Chcmicals & Auxillary materials | |
| 3. | Packing matcrials | |

| Block F | Distributive expenses during the year | | |
|---|---|---|---|
| | | Rate | Total Amount |
| 1. | Excise duty | | |
| 2. | Sales Tax | | |
| 3. | Transport Charges | | |
| 4. | Commissions to agcnts | | |
| 5. | Rebates | | |

| Block G | Demand |
|---|---|
| 1. | Direct Sales (in Rs.) |
| 2. | Sale to agents (in Rs.) |
| 3. | Others |
| 4. | Name of the market |
| 5. | Nature of the market |
| 6. | Any other specification |

| Block H | Supply |
|---|---|

1. materials supplied by others

    1.1 Source

    1.2 System of payments

    1.3 Rate of payment

2. Purchased from the market

    2.1 Source

    2.2 Mode of payment

| Block I | Receipts |
|---|---|

| | Value (in Rs.) |
|---|---|
| 1. Products and by products (excluding interm) manufactured and bold during the year | |
| 2. work done for others on materials supplied by them | |
| 3. Variation in stock of semifinished goods | |
| 4. Sale value of goods sold in the same conditions as purchased | |
| 5. Any other receipts | |

| Block J | Borrowings |
|---|---|

Medium & Long Term

| Source | Amount | Year | Rate of Intt. | Out standing at the end of year |
|---|---|---|---|---|
| 1. Government | | | | |

| Source | Amount | Year | Rate of Intt. | Out standing at the end of year |
|---|---|---|---|---|
| 2. S.F.C. | | | | |
| 3. Public sector Banks | | | | |
| 4. Cooperative Bank | | | | |
| 5. Other Banks | | | | |
| 6. Other terms lending Inst. | | | | |
| | | | Total | |
| | | | Unsatisfied Creditneed | |

| Source | Amount Borrowed | Year | Rate of Intt. | Out standing at the end of year |
|---|---|---|---|---|
| <u>Short term</u> | | | | |
| 1. Public sector Bank | | | | |
| 2. Cooperative Bank | | | | |
| 3. Other Banks | | | | |
| 4. Others | | | | |
| | | | Total | |
| | | | Unsatisfied Creditneed | |

Block K Products & by products manf. & seld during the year

| Sl. No | Manufacture | | Sale | | Distributive Expense | | | | Per Unit net sale value | Net value of out put (factory value) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Item | Quantity | Quantity | Gross sale value including D.E. | Excise Duty | Sales Tax | Other | Total | | |
| | | | | | | | | | | |

Block L Employment

| Sl. No. | Category of Workers | Number | Paid/Unpaid | If paid whether time rate or piece rate | If time rate wage/days or wage / month | If piece rate then piece rate | Average monthly emolument per worker | No. of days worked |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

Sales & Marketing

1. What is the market for year product

   (a) Local (b) Countrywide

2. Rural market or urban market

3. Demand for product

   (a) H.I.G. (b) M.I.G. (c) L.I.G.

4. Over the last three years, have total sales

   (a) Expanede (b) Contracted (c) Remained same

5. Will you go for diversification Yes/No

6. If yes, is it because of

   a. Lack of demand in the present time

   b. Rejection of demand by parent unit

   c. Cometition

   d. Any other

7. Stage of intraction with large units

   a. Supply of raw material

   b. Supply of raw machines

   c. Supply of the tech.

   d. Supply of the components

   e. Demand for your product

8. Competitors
   (a) Govt. mills(b) Private mills
   (c) Power loom (d) Handloom

9. Reasons for rejection of product by parent uni

10. Has the parent unit bought the same product from same L.S. units

11. In comparsion with the prices of the same products produced by other units, are the prices of your products.

    (a) Higher (b) Laver (c) Same

12. What ways the cometitors have an advangage over you.

13. Have you gone for technical change Yes/No

14. If yes, give details, if no give reasons.

## Schedule II

## Profile of Proprietor

1. Name
2. Locality
3. Age
4. Sex
5. Religion and Caste
6. Sector: Handloom / Powerloom
7. Educational Status
8. Migrated / Not Migrated
9. Length of year in present business: 10 / 10-30 / More than 30 Years
10. Other business interests: Yes/No
11. Family involvement: Wholly family/Partly family/ Individual
12. Willingness to shift to other profession: Yes/No/Can't say
13. Main item of production
14. Average annual turn over
15. Gross profit in last one year
16. Total consumption expenditure of household
17. Any other source of income
18. Family size
19. Total capital invested
20. Source of invested capital
21. Total expense incurred in production in last one year
22. Amount to receive
23. Amount to pay
24. Value of total inventories

**Schedule III**

Profile of Labourer

1. Name
2. Male/Female/Child
3. Age
4. Locality
5. Religion & Caste
6. Sector: Handloom / Powerloom
7. Category: Weaver / Preparatory
8. Educational Status
9. Previous Work Experience
10. Migration
11. No. of days worked in last one year
12. Family size
13. Average weekly earning
14. Average working hours
15. Method of Payment: Piece rate or time rate
16. Any Payment other than Wage: Yes/No
17. No. of years in present unit

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